

The University of Chicago

THE COMPARISON OF
TWO FORMS OF PERSIAN WRITING
BY MEANS OF SCALES CONSTRUCTED
AND STANDARDIZED
FOR THE PURPOSE

A DISSERTATION SUBMITTED TO THE
FACULTY OF THE DIVISION OF THE SOCIAL
SCIENCES IN CANDIDACY FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATION

1933

By
ARTHUR CLIFTON BOYCE

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CHAPTER I

CHARACTER OF PERSIAN WRITING

Caligraphy has been one of the Fine Arts of the Mohammedan World for many centuries. Good writers have been honored at the courts of kings and caliphs as artists have been honored in Europe.

In times past, ability to write at all was so rare that the man who could write well was considered accomplished indeed, and any man of special skill in this art was justified in spending his life at it. Printing from movable type came late, and within very recent years the most common method of book making was printing from stones. This required that the subject matter be written by hand on special paper and with special ink. Type-writers are only just beginning to appear in the Persian bazaar and government administrations and all copies have to be made laboriously by hand.

It is not strange, therefore, that handwriting has been one of the most important subjects of the school curriculum and that the writing teacher has been one of the most necessary and most honored members of the staff.

The general character of Persian writing may be seen from the accompanying plates and scales. Persian is written from right to left. The best writing is done with a reed pen and a kind of India ink which is not as fluid as ordinary fountain pen ink. The pen is cut from a special kind of reed and the pen point suited to the style and size of the document to be written. As in the days of quill pens, much time is spent by the writing teacher in class cutting pens for the boys and girls who either do not know how or do not have the necessary equipment.

At the present time, writing is usually done on a table or desk top with body and paper in much the same position as for English writing. However, many professional writers and others who wish to write with great care revert to the old style position which prevailed before the advent of tables and chairs. In that case the writer sits on the floor with his left leg under him and with the right knee nearly touching the chest. The paper is held in the left hand, which rests on the right knee, and the writing is done on the palm or fingers, which furnish a yielding backing for the paper. The paper must be rather stiff. It is sometimes

permitted for the writer to sit on a chair with one knee crossed over the other and the paper held in the hand resting on the knee.

The movement is altogether finger movement. The pen is held by the thumb and first two fingers as in English but the hand is held more on the side with the palm toward the left. Only in the "shekasteh" or cursive style of writing, which will be described later, is there a smooth, forward movement of the hand across the paper resting on the last two fingers.

Two Styles of Writing Taught in Persian Schools

There are many kinds and styles of Persian writing and several are in common use, but only two styles are taught in school. Plate I shows these two styles, which are called respectively (1) Nastaliq, and (2) Shekasteh.

(1) Nastaliq is taught in schools in two forms, "Fine" and "Coarse." The difference between them is best seen by examining the two scales,¹ one of which is to measure the quality of Fine writing, and the other the quality of Coarse writing. Fine writing is done with a fine-pointed pen like a stub pen, while Coarse writing is done with a broad-pointed pen. Fine Nastaliq is used in school books printed by the lithographic process and also in the latest books produced by photo-engraving. It is used for all formal documents and appears in Persian miniature paintings. Much correspondence is in this style, although handwriting soon becomes mixed with the second type, "Shekasteh," as the writer becomes experienced and more rapid. Coarse Nastaliq is used for headings, notices, and in the usual places where large size writing is needed. It is the basis of instruction in writing, as will be explained.

(2) Shekasteh, which means broken, is a cursive style of writing usually taught only in the first three years of the Middle School. It is more rapidly written but it is not so easily read as is Nastaliq. The letters are run together and short cuts are used which eliminate certain parts of letters. This style is also called Shekasteh-Nastaliq because many letters are the same in both, and words which have no cursive forms or combinations in them are written in the Nastaliq style.

Qualities of Merit in Persian Writing

In English handwriting as taught in American Schools, two factors are emphasized, namely, quality and speed. Effort is made

¹See Appendix.

PLATE I

TWO STYLES OF PERSIAN WRITING TAUGHT IN SCHOOLS

خط نستعلیق
سر مست درآمد از خرابات
با عقل خراب در مناجات

1. Nastaliq

خط شکسته
چشم بخلیب سیر کمرسته
قلم کعبه محض منضم آهسته

2. Shekasteh

to cultivate both in a proper proportion.

In Persian writing the only factor considered is quality. Speed is absolutely ignored, if not actually frowned upon. The reason is easy to see. In the past, time has been of little importance, so why hurry? The Persian writer was producing a work of art. He received his reward for the beauty of the product and was not asked how long it took him to do it any more than another artist would be asked how long it took him to paint a picture.

Nowadays, however, in upper-school classes where the pressure of work and amount of writing to be done forces the student to "speed up," the pupil himself cultivates a faster style, greatly to the detriment of its beauty, but in no case is the pupil ever helped to cultivate speed along with quality in the course of his regular writing classes. We will later present a small bit of evidence to show that the relation between speed and quality is negligible if not negative.

With respect to quality, the following are factors emphasized by Persian writing teachers:

I. Formation of letters

1. Size of letter in relation to size of pen
2. Smoothness and gracefulness of curves
3. Straightness of straight lines in letters
4. Uniformity of letters
5. Degree of slant of parts of certain letters
6. Choice of proper form of letter when two or more are possible
7. Shading

II. Lines

1. Straightness of lines
2. Spacing of lines on the page (uniformity and proportion)
3. Spacing of words and letters in the line

III. General

1. Placement on the page
2. Color of ink
3. Neatness and cleanness

Program of Teaching Persian Writing

A complete Persian school is divided into two divisions, an Elementary School of six years and a Middle School of six years. The first year of the Elementary School is divided into two classes, the Beginners Class and the First Class. Handwriting is usually taught by the room teacher in the Beginners class and in Grades I, II, and III. Grades higher than that are taught by a professional writing teacher. Instruction is continued to the end

of the Ninth Grade, that is, to the end of the third year of the Middle School.

In the Beginners Class and the First Grade, the children learn to write the letters and combinations of letters on the blackboard. In the second and third grades, emphasis is placed on "Coarse" Writing with ink and the broad pointed pen. Fine writing is required by the teachers of the fourth grade. In the fifth and sixth grades, the pupil does a large amount of Fine writing for the teacher. In Grades VII, VIII, and IX, "Coarse" writing is no longer required and some instruction is then given in the shekasteh or cursive style.

In all six grades of the Elementary School regular instruction is given only in the "Coarse" writing. That is, although the student has to write both Fine and Coarse Nastaliq, it is the coarse which is criticized by the teacher and in which the pupil's attention is called to specific ways in which his writing can be improved. About all the instruction he receives in Fine Nastaliq is to be told to "make it more like the model." The fine-writing exercise mainly consists of copying pages of his reading book into a notebook, so many lines a night. In addition to the writing done for the writing class, there is a considerable amount required in connection with dictation and other lessons.

Methods of Teaching Persian Writing

Instruction in Persian writing is almost wholly individual. Two general methods are used.

1. The most popular method at the present time is that of the well-known teacher of writing who bears the title "Emad-ol-Kotab," or "The Pillar of Writers." He has published two series of booklets based on the principle of guiding the pupil's writing by dotted outline letters, as shown in the reproduction here of part of one page (Plate II). The booklets are supposedly progressive in difficulty. There is one book for each month of the six school years of the elementary course. The pupil has to fill up a certain number of lines for each lesson. The theory is that the dotted letters "force" the pupil to make the right movements and cultivate the right style. Very little observation is necessary to see that this is not the case. The booklets have to be supplemented by more specific instruction.

2. When the dotted letter booklets are not used and frequently in addition to them, the teacher gives each pupil a line of "copy" which he has himself prepared beforehand. The pupil is sent to his seat to produce a certain number of lines like the copy or to work until called up again. In his turn, he is called to the teacher's side to "receive instruction," as they say. In

PLATE II

A PAGE FROM THE WRITING BOOK OF THE EMAD-OL-KOTAB

هشتم (خط خوبه مایه قرین و سادات و بیگنات) کلاسیم
 ت و ق ر ک ب ج و ف د ک ر ا ش م نویسنده که در وسط آفریده اند
 . مریع سبز فلک دیدم و داس مه نو
 . مریع سبز فلک دیدم و داس مه نو
 . مریع سبز فلک دیدم و داس مه نو
 . مریع سبز فلک دیدم و داس مه نو
 . مریع سبز فلک دیدم و داس مه نو
 . مریع سبز فلک دیدم و داس مه نو

A Lesson for the Third Class

his instruction, the teacher lays most emphasis on the formation of letters covering the points outlined above. The teacher corrects the pupil's writing by writing over it or by touching it up here and there, at the same time giving him a running commentary on each letter or other feature as he corrects it. Unfortunately, the matter usually rests there until the next lesson, but sometimes the pupil is required to do his lines over again at once if time allows.

As has been said, the copy given to the pupil and the practice lines on which "instruction" is based are done with the broad pointed pen. Almost no instruction is given on the Fine writing which the pupil hands in. The arguments for this are given and discussed in the next chapter.

An ingenious method is used to teach the proper size of letters to be made with a given pen, to measure the uniformity of letters and other features. The unit of measurement is the diagonal of a square the sides of which are the width of the pen point. Thus at the beginning of each line the pupil makes a square standing on one corner, by a simple pressure of the pen. His Persian b's, p's, and t's, which all have the same curve as their basis and differ from each other only in the number of dots above or below, must be five "squares" long; the letter n is a curve which has a mouth three "squares" wide and a depth of two "squares"; part of the letter corresponding to k is a curve which must be one "square" higher at one end than at the other. Many other proportions are worked out in this way.

CHAPTER II

PURPOSES OF THIS STUDY IN PERSIAN WRITING

The nature of Persian writing as taught in school raises many problems of interest, some of which it is the purpose of this study to investigate.

The one that comes to one's attention most frequently as one watches Persian writing teachers at work, is the peculiar relationship between Fine and Coarse writing.

Coarse Nastiliq is more like painting than it is like writing. It is done slowly. Each letter may be made with many strokes of the pen as if the pen were a brush working out an intricate design. In proper handwriting the whole stroke is made together and followed through to the end without stop. Fine Nastiliq is like the Coarse in appearance but much smaller in size. It is different in the way it is done in that it is written and not painted. The movement is rapid or at least is followed through to the end without interruption. This is especially the case when it is used outside of class.

Writing teachers say that the purpose of their instruction is to produce mastery of Fine writing; yet they teach something else. When asked why they do not teach Fine writing directly instead of spending all their effort on the coarse, which is later dropped and very seldom used, their arguments are of two kinds. The first is that Coarse writing serves as a device with which to demonstrate more easily the formation of letters, proportions of parts, shading, nature of strokes, and other features.

The second argument for Coarse writing and usually the first one given is that there is a direct transfer of training from Coarse to Fine. The teachers do not put it in that way but that is what they mean. Teachers declare that if a pupil's Coarse writing is good his Fine writing will "naturally" be good also. They argue that Coarse writing "gives strength to the hand," by which they mean that the training in Coarse writing will show itself in the smoothness, regularity, and beauty of the Fine.

The first of these arguments seems reasonable and acceptable, provided the pupil puts into practice immediately with a fine pen and in the small size, what he has just seen demonstrated and has also done with the broad pen, in the large style. However,

this is seldom the case. With the broad pointed pen it is certainly much easier to show how shading is done and how the pen must be turned to produce certain effects. It is also clear that defects of letter formation, pen movement, shading, and proportion are more easily seen in the large size writing.

The proposition that the good effects of the practice in Coarse writing will be "naturally" transferred to the Fine without specific instruction in the Fine seems to be one of more or less doubtful truth. We have here, however, on the part of Persian writing teachers, perfect faith in the transfer of training from one kind of writing which they teach to another kind of writing which they do not teach but in which they expect their pupils to make improvement. The question is, To what extent is that faith justified? To what extent is it true that the training in Coarse writing is transferred to Fine writing? This question of the relationship between the two kinds of Persian writing was our original problem.

Immediately there appears the larger preliminary problem of creating the tools with which to solve this problem of relationship. We must have means of measuring in some accurate fashion the work which the pupils do in the two kinds of writing. It is necessary, therefore, to construct two scales, one for measuring each of the two products concerned. This problem of a measuring scale for Persian writing was of first importance and was first undertaken.

The material gathered with which to test the usefulness of the scales and to serve as the basis of our study of the relationship of Fine and Coarse writing gave the opportunity at the same time of determining grade standards for these two types of Persian writing and of studying the effect of other factors, such as age, grade, individual, and class differences.

The present study therefore resolves itself into the following program:

1. Construction of scales to measure the quality of Fine and Coarse Persian Nastaliq writing.
2. Study of the reliability of the scales.
3. Study of age and grade progress in the two types of writing.
4. Examination of the relationship between the two types of writing.

CHAPTER III

CONSTRUCTION OF SCALES TO MEASURE THE QUALITY OF PERSIAN WRITING

Persian writing teachers have very positive opinions about the goodness or badness of their pupils' work but no objective way of measuring it. Some teachers use a method which approaches objectivity when marking the papers of a class, which is this: They choose one paper which to them represents the standard of the class and give it a mark. Other papers in the class are graded in comparison with this one. For another class or on another day another sample would be chosen as the basis of comparison. Some teachers said they had a scale "in their mind" but scorned the idea of a printed scale which all could use.

There is no sentence or combination of letters used by writing teachers which brings into small compass all the letters of the alphabet and which could be used for testing and scale construction. We, therefore, chose for our purposes a familiar short story from the poet Sa'adi found in all Persian reading books which runs as follows:

"They tell the story that Anushirivan in the hunting field one day wished to roast some game. There was no salt. He sent a slave to the village to get some. Anushirivan commanded that the salt be paid for so that no custom result and the village be not destroyed. They said, 'What harm or ruin can be brought to the village by this much salt?' He said, 'The foundation of oppression was little at first. Whoever came after added to it till it reached its present proportions.'"

The story is followed by a well-known quatrain:

"If the king eats an apple from the garden of a peasant,
His slaves will dig the trees up by the roots.
For every five eggs which the Sultan takes by force
His soldiers will put a thousand hens on the spits."

The story was used as material for the Fine writing scale, while the quatrain was chosen as the basis of the Coarse scale.

The following steps were taken in developing the two scales:

1. Samples of Fine and Coarse writing such as those shown

in the accompanying scales were collected from 230 students in all twelve grades of the American Elementary and Middle Schools for Boys.

2. Two hundred and eight Fine samples and 208 Coarse samples were submitted to ten judges with the instructions to classify each set of specimens into eleven groups of quality. This was done for each kind of writing (Fine and Coarse) by a series of sortings. Each judge usually first sorted the 208 Fine specimens into three piles, those that could be called Good, those that were Poor, and those that were Medium. Second, each of these piles was sorted into two or three piles and finally the sorting resulted in eleven piles, the specimens in each pile supposedly being of approximately equal quality.

3. The grades assigned by each judge were recorded, giving the specimens in the highest (Best) pile a grade of 11, those in the next pile a grade of 10, and so on, giving the lowest (worst) pile a grade of 1.

4. The grades were added and arranged in frequency tables. The Fine specimen grades ranged from 10 to 110 with a Mean of 60 and a S.D. of 26.44. The Coarse specimen grades ranged from 10 to 105 with a Mean of 56.87 and a S.D. of 23.25.

5. The number of specimens was then reduced by taking those samples nearest to the Mean and to each $1/2$ S.D. above and below the Mean. This resulted in 57 Fine and 60 Coarse specimens.

6. There seemed to be a scarcity of VERY GOOD samples and the writer was assured by the judges that writing "very much better" than these could be obtained. Better samples were obtained, not from pupils but from expert writers and teachers of writing, increasing the Fine collection to 76 in number and the Coarse collection to 78. Many samples offered as better were really not better and were rejected.

7. The 76 Fine and 78 Coarse specimens were then submitted to another set of judges, 30 in number. This group was made up as follows:

15 teachers of writing in the schools of Teheran;

8 teachers of Persian and Arabic whose work required that they be good judges of Persian writing, though they were themselves not expert writers or teachers of writing.

7 expert writers in the city, either in public administrations or in private business. These men were expert judges of writing, but not teachers.

8. The 30 judges were requested to arrange the 76 Fine and 78 Coarse samples in what they considered to be their order of merit. No opportunity was given for equal ranks. If the judge could not decide which of two specimens was better, he was

instructed to choose one of them by chance as better than the other.

9. The rank given to each sample by each judge was recorded in tables.

10. On the basis of the first ten judgments, the 76 Fine and 78 Coarse specimens were arranged in another set of tables, according to their approximate order of merit and the rank given by each judge to each sample was properly recorded.

11. From these tables, two other tables were made up as follows:

A. Table I shows the Fine samples as arranged in their approximate order of merit. Column (1) is this approximate rank. Column (2) gives the number of the specimen holding that rank. Column (3) shows the number of times out of thirty that each specimen was judged to be better than the specimen just below it. Thus, specimen #214 was given a rank above #225 by 14 out of 30 judges, #225 was judged to be better than #216 by 20 out of the 30, and so on. Column (4) gives the per cent of judges saying that each sample was better than the one just below it. For instance, 46.67 per cent of the judges ranked 214 above 225 and 66.67 per cent said that 225 was better than 216. The per cents of better judgments were then changed into Standard Deviation (S.D.) distances first by subtracting 50% from the per cents shown in Column (4), giving the figures in Column (5), and second by finding the corresponding S.D. distances from Table XII of Holzinger's Statistical Tables for Students of Education and Psychology (pages 72-74), and making correction for the fourth decimal place in Column (5). The S.D. distances of each sample above the next below it are given in Column (6). Column (7) gives the S.D. distance of each specimen above the worst specimen (#155), which was taken to be approximate zero. Beginning with the next to the lowest (Rank 75, #196), the S.D. distances in Column (6) were added, having regard to sign, and the cumulative sum was set down opposite the last number added. Thus #196 is S.D. 1.8343 above #155; #132 is S.D. .0835 above #196 and S.D. 1.9178 above #155; and so on up the table.

B. Table II shows a similar process gone through with the Coarse writing specimens, resulting in Coarse sample #225 being S.D. 14.3252 above Sample #155, with the others at varying distances in between.

12. Correction for Zero.-- Unfortunately, no specimen in the collection was bad enough to be called "zero." Specimen #155, in both Fine and Coarse collections, was the worst of all and was very bad indeed, but since here and there words and letters could be distinguished, it could not be called "zero" or be said to have

TABLE I

DETERMINATION OF RELATIVE VALUE OF SAMPLES OF FINE WRITING

(1) Approximate Rank	(2) Sample Number	(3) Times Better Than Sample Below	(4) Per Cent of Judgments Better	(5) Per Cent Better Minus 50%	(6) S.D. Distance Above Sample Below	(7) S.D. Distance Above Approximate Zero
1	214	14	.4667	-.0333	-.0835	13.7055
2	225	20	.6667	.1667	.4307	13.7890
3	216	23	.7667	.2667	.7280	13.3583
4	213	9	.3000	-.2000	-.5244	12.6303
5	227	29	.9667	.4667	1.8343	13.1547
6	211	9	.3000	-.2000	-.5244	11.3204
7	210	21	.7000	.2000	.5244	11.8448
8	221	10	.3333	-.1667	-.4307	11.3204
9	209	23	.7667	.2667	.7280	11.7511
10	218	12	.4000	-.1000	-.2533	11.0231
11	224	22	.7333	.2333	.6228	11.2764
12	23	9	.3000	-.2000	-.5244	10.6536
13	220	22	.7333	.2333	.6228	11.1780
14	222	11	.3667	-.1333	-.3406	10.5552
15	2	24	.8000	.3000	.8416	10.8958
16	223	11	.3667	-.1333	-.3406	10.0542
17	217	10	.3333	-.1667	-.4307	10.3948
18	215	23	.7667	.2667	.7280	10.8255
19	219	15	.5000	.0000	.0000	10.0975
20	52	15	.5000	.0000	.0000	10.0975
21	128	18	.6000	.1000	.2533	10.0975
22	51	17	.5667	.0667	.1679	9.8442
23	5	24	.8000	.3000	.8416	9.6763
24	38	15	.5000	.0000	.0000	8.8347
25	42	10	.3333	-.1667	-.4307	8.8347
26	101	19	.6333	.1333	.3406	9.2654
27	90	17	.5667	.0667	.1679	8.9248
28	20	20	.6667	.1667	.4307	8.7569
29	56	11	.3667	-.1333	-.3406	8.3262
30	97	9	.3000	-.2000	-.5244	8.6668
31	124	24	.8000	.3000	.8416	9.1912
32	84	17	.5667	.0667	.1679	8.3496
33	100	9	.3000	-.2000	-.5244	8.1817
34	185	15	.5000	.0000	.0000	8.7061
35	193	10	.3333	-.1667	-.4307	8.7061
36	212	20	.6667	.1667	.4307	9.1368
37	11	23	.7667	.2667	.7280	8.7061
38	74	14	.4667	-.0333	-.0835	7.9781
39	91	18	.6000	.1000	.2533	8.0616
40	84	8	.2667	-.2333	-.6228	7.8083

TABLE I (Continued)

(1) Approximate Rank	(2) Sample Number	(3) Times Better Than Sample Below	(4) Per Cent of Judgments Better	(5) Per Cent Better Minus 50%	(6) S.D. Distance Above Sample Below	(7) S.D. Distance Above Approximate Zero
41	25	10	.3333	-.1667	-.4307	8.4311
42	55	22	.7333	.2333	.6228	8.8618
43	14	12	.4000	-.1000	-.2533	8.2390
44	63	15	.5000	.0000	.0000	8.4923
45	186	12	.4000	-.1000	-.2533	8.4923
46	113	21	.7000	.2000	.5244	8.7456
47	12	8	.2667	-.2333	-.6228	8.2212
48	29	13	.4333	-.0667	-.1679	8.8440
49	39	19	.6333	.1333	.3406	9.0119
50	77	18	.6000	.1000	.2533	8.6713
51	125	11	.3667	-.1333	-.3406	8.4180
52	191	18	.6000	.1000	.2533	8.7586
53	68	12	.4000	-.1000	-.2533	8.5055
54	47	20	.6667	.1667	.4307	8.7586
55	79	19	.6333	.1333	.3406	8.3279
56	171	13	.4333	-.0667	-.1679	7.9873
57	156	17	.5667	.0667	.1679	8.1552
58	59	18	.6000	.1000	.2533	7.9873
59	26	26	.8667	.3667	1.1109	7.7340
60	150	10	.3333	-.1667	-.4307	6.6231
61	60	19	.6333	.1333	.3406	7.0538
62	65	22	.7333	.2333	.6228	6.7132
63	159	18	.6000	.1000	.2533	6.0904
64	175	21	.7000	.2000	.5244	5.8371
65	203	16	.5333	.0333	.0835	5.3127
66	208	19	.6333	.1333	.3406	5.2292
67	140	16	.5333	.0333	.0835	4.8886
68	202	14	.4667	-.0333	-.0835	4.8051
69	169	21	.7000	.2000	.5244	4.8886
70	134	18	.6000	.1000	.2533	4.3642
71	144	28	.9333	.4333	1.5008	4.1109
72	205	17	.5667	.0667	.1679	2.6101
73	135	21	.7000	.2000	.5244	2.4422
74	132	16	.5333	.0333	.0835	1.9178
75	196	29	.9667	.4667	1.8343	1.8343
76	155	--	----	----	-----	.0000

TABLE II

DETERMINATION OF RELATIVE VALUE OF SAMPLES OF COARSE WRITING

(1) Approximate Rank	(2) Sample Number	(3) Times Better Than Sample Below	(4) Per Cent of Judgments Better	(5) Per Cent Better Minus 50%	(6) S.D. Distance Above Sample Below	(7) S.D. Distance Above Approximate Zero
1	225	19	.6333	.1333	.3406	14.3252
2	213	18	.6000	.1000	.2533	13.9846
3	227	16	.5333	.0333	.0835	13.7313
4	216	28	.9333	.4333	1.5008	13.6478
5	209	21	.7000	.2000	.5244	12.1470
6	210	14	.4667	-.0333	-.0835	11.6226
7	215	23	.7667	.2667	.7280	11.7061
8	224	16	.5333	.0333	.0835	10.9781
9	223	20	.6667	.1667	.4307	10.8946
10	217	11	.3667	-.1333	-.3406	10.4639
11	226	17	.5667	.0667	.1679	10.8045
12	221	21	.7000	.2000	.5244	10.6366
13	220	18	.6000	.1000	.2533	10.1122
14	129	17	.5667	.0667	.1679	9.8589
15	101	13	.4333	-.0667	-.1679	9.6910
16	93	16	.5333	.0333	.0835	9.8589
17	214	10	.3333	-.1667	-.4307	9.7754
18	89	16	.5333	.0333	.0835	10.2061
19	110	16	.5333	.0333	.0835	10.1226
20	104	16	.5333	.0333	.0835	10.0391
21	103	17	.5667	.0667	.1679	9.9556
22	45	24	.8000	.3000	.8416	9.7877
23	218	8	.2667	-.2333	-.6228	8.9461
24	128	20	.6667	.1667	.4307	9.5689
25	219	14	.4667	-.0333	-.0835	9.1382
26	222	26	.8667	.3667	1.1109	9.2217
27	32	9	.3000	-.2000	-.5244	8.1108
28	46	24	.8000	.3000	.8416	8.6352
29	184	4	.1333	-.3667	-1.1109	7.7936
30	3	15	.5000	.0000	.0000	8.9045
31	86	20	.6667	.1667	.4307	8.9045
32	18	15	.5000	.0000	.0000	8.4738
33	212	12	.4000	-.1000	-.2533	8.4738
34	8	13	.4333	-.0667	-.1679	8.7271
35	7	19	.6333	.1333	.3406	8.8950
36	25	14	.4667	-.0333	-.0835	8.5544
37	73	21	.7000	.2000	.5244	8.6379
38	102	9	.3000	-.2000	-.5244	8.1135
39	16	19	.6333	.1333	.3406	8.6379
40	42	14	.4667	-.0333	-.0835	8.2973

TABLE II (Continued)

(1) Approximate Rank	(2) Sample Number	(3) Times Better Than Sample Below	(4) Per Cent of Judgments Better	(5) Per Cent Better Minus 50%	(6) S.D. Distance Above Sample Below	(7) S.D. Distance Above Approximate Zero
41	98	17	.5667	.0667	.1679	8.3808
42	36	13	.4333	-.0667	-.1679	8.2129
43	97	18	.6000	.1000	.2533	8.3808
44	124	10	.3333	-.1667	-.4307	8.1275
45	91	24	.8000	.3000	.8416	8.5582
46	50	16	.5333	.0333	.0835	7.7166
47	12	21	.7000	.2000	.5244	7.6331
48	178	15	.5000	.0000	.0000	7.1087
49	24	13	.4333	-.0667	-.1679	7.1087
50	111	22	.7333	.2333	.6228	7.2766
51	177	22	.7333	.2333	.6228	6.6538
52	163	10	.3333	-.1667	-.4307	6.0310
53	156	13	.4333	-.0667	-.1679	6.4617
54	173	9	.3000	-.2000	-.5244	6.6296
55	72	23	.7667	.2667	.7280	7.1540
56	172	18	.6000	.1000	.2533	6.4260
57	181	12	.4000	-.1000	-.2533	6.1727
58	63	22	.7333	.2333	.6228	6.4260
59	55	11	.3667	-.1333	-.3406	5.8032
60	41	15	.5000	.0000	.0000	6.1438
61	48	10	.3333	-.1667	-.4307	6.1438
62	64	22	.7333	.2333	.6228	6.5745
63	28	13	.4333	-.0667	-.1679	5.9517
64	31	15	.5000	.0000	.0000	6.1196
65	174	24	.8000	.3000	.8416	6.1196
66	149	21	.7000	.2000	.5244	5.2780
67	148	12	.4000	-.1000	-.2533	4.7536
68	146	10	.3333	-.1667	-.4307	5.0069
69	53	17	.5667	.0667	.1679	5.4376
70	162	16	.5333	.0333	.0835	5.2697
71	179	24	.8000	.3000	.8416	5.1862
72	167	17	.5667	.0667	.1679	4.3446
73	147	24	.8000	.3000	.8416	4.1767
74	138	11	.3667	-.1333	-.3406	3.3351
75	204	28	.9333	.4333	1.5008	3.6757
76	196	19	.6333	.1333	.3406	2.1749
77	132	29	.9667	.4667	1.8343	1.8343
78	155	--	----	----	-----	.0000

"just no merit" as handwriting. It was necessary, therefore, to locate Specimen 155 with reference to real Zero and adjust other values accordingly. The process for the Fine Zero was as follows:

(a) Specimen 155 was submitted to ten judges with the request to estimate its value above zero on a per cent scale, the best sample in the collection being called 100. Estimates ranged from 3 to 10 with a mean value of 6.7.

(b) If the best specimen (#225) which we called 100% was S.D. 13.7890 above Specimen #155 and the latter was 6.7% above zero, then the distance S.D. 13.7890 corresponds to $100 - 6.7$ or 93.3% of difference on a per cent scale. Then 6.7% equals S.D. .9902 and all the S.D. values based on #155 as approximate zero must be raised S.D. .9902 to give their equivalent values above real zero.

(c) Table III gives the Fine specimens arranged in their Real rank order on the basis of thirty judgments. Column (3) of this table gives the S.D. distances of each sample above Approximate Zero. Column (4) gives the corrected values of the S.D. distances of each specimen above Real Zero. Column (5) gives the corresponding per cent values.

(d) A similar process was gone through to correct the values of the Coarse specimens and give their corresponding per cent values. Specimen #155 was the worst but could not be said to have "just no merit" as writing. It had some but very little merit. The ten judges varied in their estimates from 2 to 5 with a mean estimated value of 3.5%, Coarse Specimen #225 being called 100. If Specimen #225 is S.D. 14.3252 or 96.5% above #155, then with respect to the Coarse specimens 3.5% equals S.D. .5195 and all the Standard Deviation values have to be raised by S.D. .5195 to give them their true distance above Real Zero and the proper corresponding per cent values.

(e) Table IV gives the Coarse specimens arranged in their Real rank order. Column (3) of this table gives the S.D. distance of each sample above Approximate Zero. Column (4) gives the corrected values of the S.D. distances above Real Zero. Column (5) again gives the corresponding per cent values for the Coarse specimens.

13. Percentage values for the scales.- For two reasons it was desirable to have the scale values stated in per cents instead of the S.D. values; one was the ease of explanation and the other was avoidance of confusion with the Persian marking system.

(a) The metric system is familiar to Persian teachers and students, and if the steps on the scale could be given in per cents from 0 to 100 corresponding to a meter stick, the idea of the writing scale could be easily explained and understood.

TABLE III

DETERMINATION OF PER CENT VALUES FOR SAMPLES OF FINE WRITING

(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Real Rank	Sample Number	S.D. Distance Above Approximate Zero	S.D. Distance Above Corrected Zero	Per Cent Value	Real Rank	Sample Number	S.D. Distance Above Approximate Zero	S.D. Distance Above Corrected Zero	Per Cent Value
1 . .	225	13.7890	14.7792	100.	41 . .	97	8.6668	9.6570	65.4
2 . .	214	13.7055	14.6957	99.4	42 . .	68	8.5053	9.4955	64.2
3 . .	216	13.3583	14.3485	97.	43 . .	63	8.4923	9.4825	64.2
4 . .	227	13.1547	14.1449	95.7	44 . .	186	8.4923	9.4825	64.2
5 . .	213	12.6303	13.6205	92.2	45 . .	25	8.4311	9.4213	63.7
6 . .	210	11.8448	12.8350	86.8	46 . .	125	8.4180	9.4082	63.6
7 . .	209	11.7511	12.7413	86.2	47 . .	84	8.3496	9.3398	63.1
8 . .	211	11.3204	12.3106	83.3	48 . .	79	8.3279	9.3181	63.
9 . .	221	11.3204	12.3106	83.3	49 . .	56	8.3262	9.3164	63.
10 . .	224	11.2764	12.2666	83.	50 . .	14	8.2390	9.2292	62.4
11 . .	220	11.1780	12.1682	82.3	51 . .	12	8.2212	9.2114	62.3
12 . .	218	11.0231	12.0133	81.3	52 . .	100	8.1917	9.1719	62.1
13 . .	2	10.8958	11.8860	80.4	53 . .	156	8.1552	9.1454	61.8
14 . .	215	10.8255	11.8157	79.9	54 . .	91	8.0616	9.0518	61.2
15 . .	23	10.6536	11.6438	78.8	55 . .	171	7.9873	8.9775	60.7
16 . .	222	10.5552	11.5454	78.1	56 . .	59	7.9873	8.9775	60.7
17 . .	217	10.3948	11.3850	77.	57 . .	74	7.9781	8.9683	60.7
18 . .	219	10.0975	11.0877	75.	58 . .	184	7.8083	8.7985	59.5
19 . .	52	10.0975	11.0877	75.	59 . .	26	7.7340	8.7242	59.
20 . .	128	10.0975	11.0877	75.	60 . .	60	7.0538	8.0440	54.4
21 . .	223	10.0542	11.0444	74.7	61 . .	65	6.7132	7.7034	52.1
22 . .	51	9.8442	10.8344	73.3	62 . .	150	6.6231	7.6133	51.5
23 . .	5	9.6763	10.6665	72.2	63 . .	159	6.0904	7.0806	47.4
24 . .	101	9.2654	10.2656	69.4	64 . .	175	5.8371	6.8273	46.2
25 . .	124	9.1912	10.1814	68.8	65 . .	203	5.3127	6.3029	42.6
26 . .	212	9.1368	10.1270	68.5	66 . .	208	5.2292	6.2194	42.
27 . .	39	9.0119	10.0021	67.1	67 . .	140	4.8886	5.8788	39.7
28 . .	90	8.9248	9.9150	67.	68 . .	169	4.8886	5.8788	39.7
29 . .	55	8.8618	9.8520	66.7	69 . .	202	4.8051	5.7953	39.2
30 . .	29	8.8440	9.8342	66.5	70 . .	134	4.3642	5.3544	36.2
31 . .	38	8.8347	9.8249	66.5	71 . .	144	4.1109	5.1011	34.5
32 . .	42	8.8347	9.8249	66.5	72 . .	205	2.6101	3.6003	24.4
33 . .	191	8.7586	9.7488	65.9	73 . .	135	2.4422	3.4324	23.2
34 . .	47	8.7586	9.7488	65.9	74 . .	132	1.9178	2.9080	19.6
35 . .	20	8.7569	9.7471	65.9	75 . .	196	1.8343	2.8245	19.1
36 . .	113	8.7456	9.7358	65.9	76 . .	155	.0000	.9902	6.7
37 . .	185	8.7061	9.6963	65.6					
38 . .	193	8.7061	9.6963	65.6					
39 . .	11	8.7061	9.6963	65.6					
40 . .	77	8.6713	9.6615	65.4					

TABLE IV

DETERMINATION OF PER CENT VALUES FOR SAMPLES OF COARSE WRITING

(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Real Rank	Sample Number	S.D. Dis- tance Above Approximate Zero	S.D. Dis- tance Above Corrected Zero	Per Cent Value	Real Rank	Sample Number	S.D. Dis- tance Above Approximate Zero	S.D. Dis- tance Above Corrected Zero	Per Cent Value
1 . .	225	14.3252	14.8447	100.	41 . .	36	8.2129	8.7324	58.8
2 . .	213	13.9846	14.5041	97.7	42 . .	124	8.1275	8.6470	58.3
3 . .	227	13.7313	14.2508	96.	43 . .	102	8.1135	8.6330	58.2
4 . .	216	13.6478	14.1673	96.5	44 . .	32	8.1108	8.6303	58.1
5 . .	209	12.1470	12.6665	85.3	45 . .	184	7.7936	8.3131	56.
6 . .	215	11.7061	12.2256	82.3	46 . .	50	7.7166	8.2381	55.5
7 . .	210	11.6226	12.1421	81.8	47 . .	12	7.6331	8.1526	54.9
8 . .	224	10.9781	11.4976	77.4	48 . .	111	7.2766	7.7961	52.5
9 . .	223	10.8946	11.4141	76.9	49 . .	72	7.1540	7.8735	51.7
10 . .	226	10.8045	11.3240	76.3	50 . .	178	7.1087	7.6282	51.4
11 . .	221	10.6366	11.1561	75.1	51 . .	24	7.1087	7.6282	51.4
12 . .	217	10.4639	10.9834	74.	52 . .	177	6.6538	7.1733	48.3
13 . .	89	10.2061	10.7256	72.2	53 . .	173	6.6296	7.1491	48.2
14 . .	110	10.1226	10.6421	71.7	54 . .	64	6.5745	7.0940	47.8
15 . .	220	10.1122	10.6317	71.6	55 . .	156	6.4617	6.9812	47.
16 . .	104	10.0391	10.5586	71.1	56 . .	172	6.4260	6.9455	46.8
17 . .	103	9.9556	10.4751	70.5	57 . .	63	6.4260	6.9455	46.8
18 . .	129	9.8589	10.3784	69.9	58 . .	181	6.1727	6.6922	45.1
19 . .	93	9.8589	10.3784	69.9	59 . .	41	6.1438	6.6633	44.9
20 . .	45	9.7877	10.3072	69.4	60 . .	48	6.1438	6.6633	44.9
21 . .	214	9.7754	10.2949	69.3	61 . .	31	6.1196	6.6391	44.7
22 . .	101	9.6910	10.2105	68.8	62 . .	174	6.1196	6.6391	44.7
23 . .	128	9.5689	10.0884	67.9	63 . .	163	6.0310	6.5505	44.1
24 . .	222	9.2217	9.7412	65.6	64 . .	28	5.9517	6.4712	43.6
25 . .	219	9.1382	9.6577	65.	65 . .	55	5.8032	6.3227	42.6
26 . .	218	8.9461	9.4656	63.7	66 . .	53	5.4376	5.9571	40.1
27 . .	3	8.9045	9.4240	63.5	67 . .	149	5.2780	5.7975	39.
28 . .	86	8.9045	9.4240	63.5	68 . .	162	5.2697	5.7892	39.
29 . .	7	8.8950	9.4145	63.4	69 . .	179	5.1862	5.7057	38.4
30 . .	8	8.7271	9.2466	62.3	70 . .	146	5.0069	5.5264	37.2
31 . .	73	8.6379	9.1574	61.7	71 . .	148	4.7536	5.2731	35.5
32 . .	16	8.6379	9.1574	61.7	72 . .	167	4.3446	4.8641	32.8
33 . .	46	8.6352	9.1547	61.7	73 . .	147	4.1767	4.6962	31.6
34 . .	91	8.5582	9.0777	61.1	74 . .	204	3.6757	4.1952	28.2
35 . .	25	8.5544	9.0739	61.1	75 . .	138	3.3351	3.8546	26.
36 . .	18	8.4738	8.9933	60.6	76 . .	196	2.1749	2.6944	18.1
37 . .	212	8.4738	8.9933	60.6	77 . .	132	1.8343	2.3538	15.8
38 . .	98	8.3808	8.9003	60.	78 . .	155	-----	.5195	3.5
39 . .	97	8.3808	8.9003	60.					
40 . .	42	8.2973	8.8168	59.4					

(b) The marking system in Persian schools is on a basis of 20, with the following approximate meanings: excellent, 19-20; good, 15-18; medium, 10-14; poor, 6-9; and failure, 0-5. A scale expressed in the S.D. values would be satisfactory to the investigator for his personal purposes but would certainly cause confusion with Persian teachers, who would think of them as corresponding to the Persian school grading system, which they do not.

It is also necessary to make it easy to distinguish between "grades" and "scores." The score which a given paper receives depends on its quality and is determined by comparison with the scale. The "mark" or "grade" given depends on how good it is for the stage of development the student has reached. When the writer first asked for judgments on quality of writing, a constant question of the judges was, "What class did this sample come from?" They wanted to give a "grade" to the paper. It was difficult at first to persuade some judges to consider quality of writing apart from the class to which the pupil belonged.

14. Final choice of scale samples.- It was desirable to find samples which fell at regular intervals 10, 20, 30, 40, etc., up to 90 but, as is seen from Tables III and IV, the values did not fall that way. Specimens therefore had to be chosen so that 8 or 9 of them would cover the whole range of values by equal or approximately equal steps, falling on some other points than the even tens. The specimens finally chosen are shown in Table V.

TABLE V

FINAL CHOICE OF SCALE SAMPLES

Fine Scale				Coarse Scale			
Specimen Number	S.D. Value	Real Per Cent Value	Scale Value Called	Specimen Number	S.D. Value	Real Per Cent Value	Scale Value Called
213 . .	13.6205	92.2	92	216 . .	14.1673	95.4	95
220 . .	12.1682	82.3	82	209 . .	12.6665	85.3	85
5 . .	10.6665	72.2	72	221 . .	11.1561	75.1	75
156 . .	9.1454	61.8	62	219 . .	9.6577	65.	65
65 . .	7.7034	52.1	52	184 . .	8.3131	56.	56
208 . .	6.2194	42.	42	181 . .	6.6922	45.1	45
144 . .	5.1011	34.5	35	148 . .	5.2731	35.5	36
205 . .	3.6003	24.4	24	138 . .	3.8546	26.	26
196 . .	2.8245	19.1	19	132 . .	2.3538	15.8	16

The next chapter shows how these two scales were tested and used as measures of Persian writing ability by Persian schools.

Effect of other possible locations of the Zero point.- The question arises from the point of view of statistical method whether the choice of samples and their location on the scales is justified. As will be seen, the question also arises when a practical test of the scales is made and we attempt to make a direct comparison of the results obtained by using the scales. The most vital point is that of the location of the Zero points of the two scales. The effect of several different locations of the Zero point will here be discussed.

Location of Zero on the Fine scale.- The easiest and most satisfactory method of locating Zero would have been to have a specimen which a large number of judges agreed upon as having "just no merit" as Persian Fine Nastaliq writing. As has been shown, the worst specimen of all was not bad enough to be called "zero." It was necessary then to fall back upon the next most direct method, namely, having ten judges specify what in their estimation was the distance on a per cent scale of the given specimen (#155) above real zero. In this case, the location of zero depends upon the accuracy of the estimate of the ten judges and is no more true than the average of their individual opinions. The estimated Zero can be made more exact when a revision of the scale is made, by obtaining or manufacturing several specimens worse than #155 and having them all estimated by a larger number of judges.

The location of Zero has been attempted in other ways, as shown below, but it is not evident that the results obtained are as good as those obtained by the method adopted.

The values of the 76 Fine specimens listed in Table III, column (3), results in the distribution given in Table VI and Figure 1. The Mean is 8.44 and the Standard Deviation 2.75. Under the distribution represented in Figure 1, there are five series or sets of values, depending on various locations for Zero. Series (1) gives the original scale values obtained from column (3) of Table III. The lowest sample is that which we called "Approximate Zero." The best sample had a value of S.D. 13.789 and is here called 14. What these values become when translated to a per cent scale depends on the length of the per cent scale and the location of "real zero."

Series (2) in Figure 1 shows the values changed directly to the per cent scale without correction, zero of Series (1) being zero of Series (2) and 14 of Series (1) equalling 100 of Series (2).

Series (3) shows the effect of the correction made for

TABLE VI

DISTRIBUTION OF FINE SPECIMENS IN TERMS OF S.D. DISTANCES ABOVE APPROXIMATE ZERO*

Range	Mid-Point	Frequency
13.5 - 14.49	14	2
12.5 - 13.49	13	3
11.5 - 12.49	12	2
10.5 - 11.49	11	9
9.5 - 10.49	10	7
8.5 - 9.49	9	19
7.5 - 8.49	8	17
6.5 - 7.49	7	3
5.5 - 6.49	6	2
4.5 - 5.49	5	5
3.5 - 4.49	4	2
2.5 - 3.49	3	1
1.5 - 2.49	2	3
.5 - 1.49	1	1
-0.5 - .49	0	1
Number . . .		76
Mean	8.44	
S.D.	2.75	

*Data from Table III
Column (3).

TABLE VII

DISTRIBUTION OF COARSE SPECIMENS IN TERMS OF S.D. DISTANCES ABOVE APPROXIMATE ZERO*

Range	Mid-Point	Frequency
13.5 - 14.49	14	4
12.5 - 13.49	13	
11.5 - 12.49	12	3
10.5 - 11.49	11	4
9.5 - 10.49	10	12
8.5 - 9.49	9	12
7.5 - 8.49	8	12
6.5 - 7.49	7	7
5.5 - 6.49	6	11
4.5 - 5.49	5	6
3.5 - 4.49	4	3
2.5 - 3.49	3	1
1.5 - 2.49	2	2
.5 - 1.49	1	
-0.5 - .49	0	1
Number . . .		78
Mean	8.0	
S.D.	2.7	

*Data from Table IV
Column (3).

Zero and is the scale of values actually adopted. Placing "real zero" at 6.7 points below the "approximate zero" according to the average opinion of the ten judges and still calling the best sample 100 lengthens out the per cent scale and raises the per cent values of the samples. Those in the lower part of the scale are raised more than those in the upper part. The "approximate zero" sample now has a value of 6.7, Ten is raised to 16, Twenty to 25, Seventy to 71, Ninety to slightly above 90, and 100 remains the same. Any lowering of the Zero point will have the same effect if one leaves 100 as it is. The increase of values of the samples decreases as one ascends the scale.

Thus Series (4) of Figure 1 shows the effect of placing "real zero" at 6 S.D. below the best sample. The specimen which was "approximate zero" now becomes nearly 10, Ten becomes approximately 19, Twenty becomes approximately 28, and so forth up the scale, with decreasing additions until Ninety becomes approximately 91, and one hundred remains the same. The chief objection to this location is its effect in raising the values in the poorer

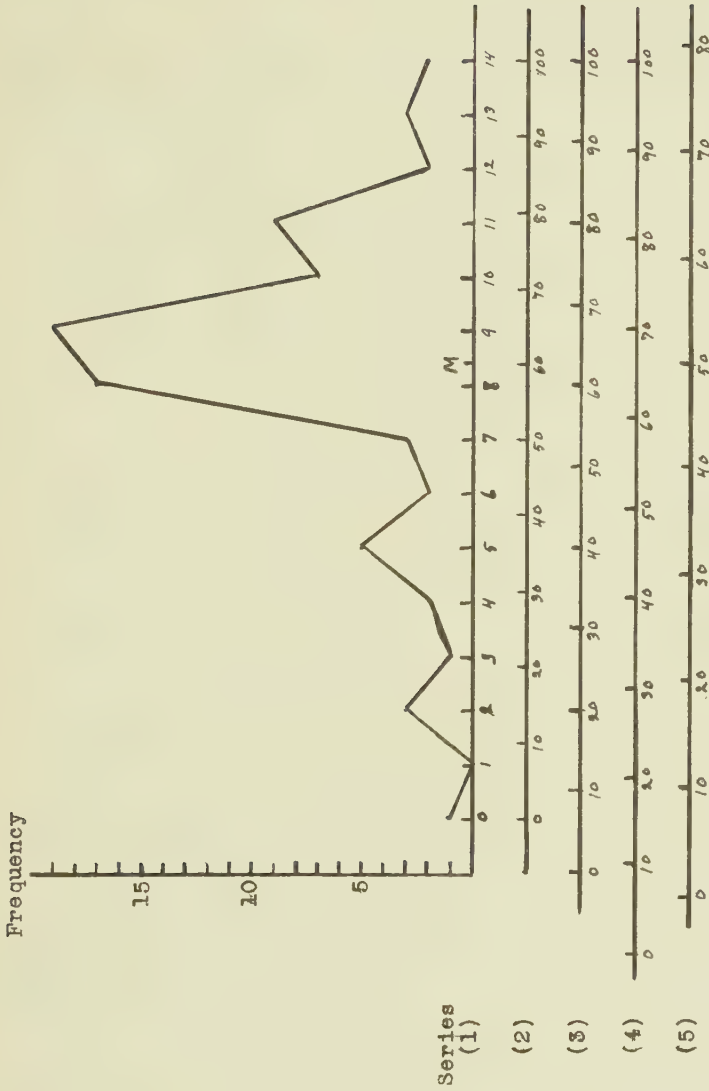


Fig. 1.- Distribution of scores of 76 Fine Samples.
Scales showing effect of different locations of Zero:
Series (1) - Original S.D. Values
(2) - Per cent values, Uncorrected Zero
(3) - Per cent values, Corrected Zero
(4) - Per cent values, Zero at 6 S.D. below Best sample
(5) - Per cent values, Zero at 3.5 S.D. below the Mean

specimens. There is no reason to believe that these values should be raised more than the values of the better specimens, or more than has already been done by the correction in Series (3).

If on the other hand one assumes that 50 on the per cent scale should be the Mean of the original values and place Zero at, for instance, 3.5 Standard Deviations below the Mean, the result is the set of per cent values shown in Series (5) of Figure 1. The effect of this is to place the Zero point slightly below the corrected Zero of Series (3) and shift the 100 point greatly to the right, making an increasing reduction in values as one goes up the scale. That which was "corrected zero" now has a value of about 2 per cent, Ten becomes 9 plus, Fifty becomes 40, Eighty becomes 62, and the best of all, which was originally 100, becomes in this arrangement a little less than 80. Placing "real zero" at 5 S.D. below the Mean as has been suggested would displace the values still worse, greatly increasing the value of the poor specimens and also greatly reducing the values of the best samples.

While the place of Zero in Series (5) is probably not far from the truth, there are two serious objections to this arrangement. In the first place, putting 50 at the Mean presupposes that the collection is unselected and represents the whole population under consideration. While it does represent the whole range of quality, the collection is not unselected. As explained previously, 19 superior samples were added to the collection before the final judgments were made and the surface of frequency is skewed instead of being normal. The second objection is that this arrangement places 100 more than twenty points higher than the present best sample and indicates that the specimen called best is very far from the Theoretical Best. The writer's whole experience leads him to reject this supposition. While it is possible that the Best specimen might be discounted somewhat, say two or three per cent, it is certainly not 20 per cent below "real best," as that best is produced by the most expert writers of Persian in Persia today. Placing Zero at an arbitrary theoretical point is possible but would not be as true as the estimated location of it by the ten judges on which the scale values have been based.

Location of Zero on the Coarse scale.- The arguments given above with reference to the location of Real Zero on the Fine scale apply also to the location of Real Zero on the Coarse scale.

Figure 2 shows the distribution of the original scale values given in Table VII (page 22) and the various values on the per cent scale that would result from different locations of Zero. Series (1) gives the values based on "approximate zero."

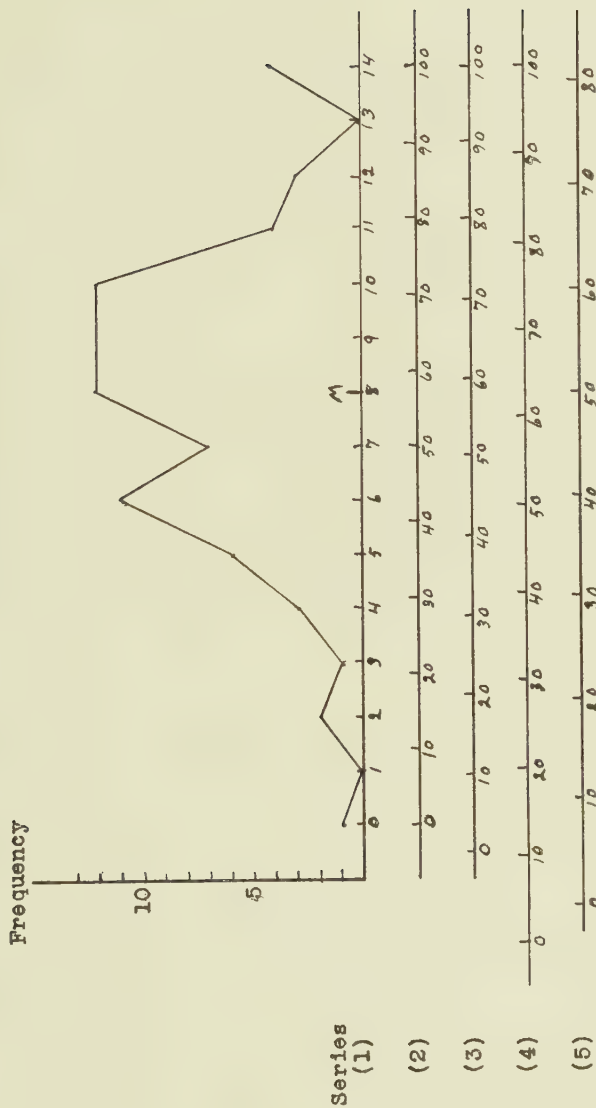


Fig. 2.- Distribution of scores of 78 Coarse samples.
Scales showing effect of different locations of Zero:
Series (1) - Original S.D. values
(2) - Per cent values - Uncorrected Zero
(3) - Per cent values - Corrected Zero
(4) - Per cent values - Zero at 6 S.D. below Best sample
(5) - Per cent values - Zero at 3.5 S.D. below the Mean

Series (2) shows the values based on "corrected zero" which was the estimate of ten judges of the distance of the worst specimen above "real zero." This was the series of values adopted for the tentative Coarse scale. The worst Coarse specimen was obviously nearer to Real Zero than the worst Fine specimen was, so that the differences between Series (2) and (3) are not as great as was true with the Fine scale. Lowering the Zero point as in Series (4) raises the values probably unduly. Placing 50 at the Mean raises values below twenty but lowers all others increasingly as one goes up the scale until the Best specimen becomes valued only at about 81. The Best specimen is certainly not 19 per cent below Real Best and this arrangement of the scale is obviously incorrect.

While the location of Zero at an arbitrary point is theoretically possible, the writer returns to the Zero as adopted in Series (3) as the one which is probably nearest the truth as one is able to determine it for this tentative scale. As was said with reference to the Fine scale, a larger number of judges using specimens worse than the "approximate zero" sample may come nearer to giving scale values based on "real zero."

From the point of view of practical use with Persian writing teachers, it is also necessary or at least extremely desirable that the Zero point be as nearly as possible that of "just no merit" rather than a theoretical location.

CHAPTER IV

RELIABILITY OF THE SCALES

Source of material.— Samples of writing to be used (1) as a basis of testing the reliability of the scales, (2) for determining standard performances, and (3) for studying the other problems proposed were obtained from eight different schools in Teheran distributed as shown in Table VIII.

TABLE VIII

SOURCE OF SAMPLES OF PUPILS' HANDWRITING

No.	Name of School	Character of School	Number of Pupils in Grade									Total
			I	II	III	IV	V	VI	VII	VIII	IX	
1	American El.	Private	21	29	37	46	48	31				212
2	Zoroastrian	Private				17	23	30	27	16	11	124
3	Alameh	Government			51	30	27	30				138
4	Safavi	Government		31	48	29	20	15				143
5	Danesh	Government		59	31	22	17	16				125
6	Dagigi	Government		32	34	30	25	19				140
7	Pahlavi	Government		10	12	13	13	10	47	39	27	171
8	Aghdasieh	Private							27	25	22	74
Total			21	141	213	187	173	151	101	80	60	1127

These are all schools for boys and represent a very good sample of Government and Private schools. The specimens were taken during the period from January 27, 1932, to March 10, 1932, and may be considered as giving representative results for the middle of the year. Obviously, other studies must be made to determine standards of performance at the end of the year, the comparison of boys and girls, and the performance of schools in other cities, as well as a wider selection of schools in Teheran.

The writing teachers of these schools were furnished with two sets of papers, one for securing Fine samples and one for Coarse. The papers had printed headings asking for name of school,

date, pupil's name, class, and age. The papers for the Fine samples had the material of the Fine scale printed on one-half of the page with appropriate space for copying it. Similarly, the papers for Coarse writing required the foregoing information and gave the first two lines of the Persian poem to be copied with broad pen in the proper place. The writing was done as a regular class exercise. Afterward, Fine and Coarse samples from each pupil were given identical numbers, which also indicated the school and class of which the pupil was a member. Record sheets were made up, using the identifying numbers for reference. Within the class, the papers were arranged according to ages, beginning with the youngest.

Scoring the papers.- All of the 2,254 papers were scored according to the scales by three judges who had worked with us in the formation of the scales, were conscientious workers, and were interested in the problems involved. One was an expert writer and a teacher of writing, the two others were teachers of Elementary grades and expert judges of writing but teachers of other subjects. All three were given the following directions and were carefully trained in the use of the scales.

"1. Consider only the quality of the writing to be measured. Mistakes in spelling or grammar are not to be counted. With reference to any specimen to which you wish to give a number, answer these questions: 'Is this writing better than, just as good as, or worse than such and such a sample on the scale?' If it is not the same quality as any sample on the scale, to which sample is it nearest in goodness? Is it better or worse than this sample?

"2. Beginning with the lower end of the scale, run the unknown specimen up the scale until you find a sample which it most nearly resembles in quality.

"3. If you judge the specimen to correspond exactly to a scale sample, give it that number. If you judge it to be better than one sample but not as good as the one above it, give it an intermediate number corresponding to its nearness to one or the other.

"4. After you have determined a number for the writing in this way, take it to the top of the scale and find its place again by comparing it with successive samples down the scale. Give it a number to which it most nearly corresponds, either a number on the scale or one intermediate between two of the given samples.

"5. If the number you give the second time differs from the first, give a number half-way between the two estimates."

The judges did their work separately and in the presence

of the writer, who recorded their judgments as soon as announced. In order to overcome any effect of contrast, the papers were judged in different orders within the class and, instead of going from a high class of one school to the low class of another, the classes were presented in an ascending, descending order. In those few cases where there was more than ten points difference between two scores given any paper, the judges were asked to repeat their judgments. Sometimes they changed the scores given; more often they did not. The final score given a paper was the average of the three scores.

Preliminary to the statistical work with the scores and information given by the pupils, all the information in regard to each pair of papers was assembled on one data card. On each card there were four numbers, as shown here.

2301	7
38.3	24.6

This indicated (1) that this pupil was in the third class of School II, (2) that he gave his age as 7 years, (3) that the average score given to his Fine writing was 38.3 on the Fine scale, and (4) that the average score given to his Coarse writing was 24.6 on the Coarse scale.

Uniformity of judgments.- To what extent do the scores given by one judge differ from those given by others? This is considered first from the point of view of class averages.

Variations in class averages.- To what extent do the scores given to a class by Judge A differ from the class averages given by Judges B and C? For each of the forty-two classes measured we have an average score for each judge and an average of all three judges. The average scores for the classes for all the judges are given in Table IX. Taking the average of the three as the true class average and tabulating the differences from this in each case, we arrive at a summary table (Table X) which shows the plus, minus, and total error (or difference from the true average) for each judge and forty-two classes in both Fine and Coarse scores. Dividing the total error by 42 gives the average amount by which each judge differed from the true average in 42 class averages.

In this table certain differences appear in the amount and direction of error from one judge to another, but the average errors are after all very small, varying from 1.0 to 1.46 in the Fine averages and 1.11 to 1.63 in the Coarse averages. Judge C is evidently more severe than the others because his errors tend to the negative side of the true average. Judge A is more liberal in Fine and Judge B more liberal in Coarse.

Variation in individual scores.- In order to test the

TABLE IX

CLASS AND GRADE AVERAGES—FINE AND COARSE SCORES

Grade Averages - Fine Scores									
Grade	School								Average
	I	II	III	IV	V	VI	VII	VIII	
1	40.8								40.8
2	49.8			58.6	55.7	60.2	53.7		55.6
3	53.6		63.4	64.8	63.3	64.7	65.6		62.5
4	58.1	67.5	66.1	65.3	65.9	65.0	65.9		64.8
5	62.1	67.5	66.6	66.6	67.1	65.3	69.0		66.3
6	65.9	68.0	67.2	67.3	68.4	69.0	69.2		67.8
7		68.6					67.5	67.6	67.9
8		70.6					70.7	66.6	69.3
9		70.6					69.4	68.5	69.5

Grade Averages - Coarse Scores									
Grade	School								Average
	I	II	III	IV	V	VI	VII	VIII	
1	31.6								31.6
2	36.9			35.7	36.6	37.4	33.5		36.0
3	41.8		40.6	44.0	38.7	42.0	44.8		41.9
4	47.4	49.5	50.4	48.9	49.0	45.0	57.7		49.7
5	47.1	50.4	52.1	51.1	53.3	52.7	58.4		52.1
6	51.0	54.6	55.8	54.7	60.3	57.9	59.1		56.2
7		57.1					57.8	58.6	57.8
8		60.0					60.4	55.5	58.6
9		58.7					63.0	61.3	61.0

TABLE X

COMPARATIVE ERROR IN 42 CLASS AVERAGES

Judge	Fine Scores			Coarse Scores		
	A	B	C	A	B	C
Plus Error	51.9	21.2	6.3	22.4	56.9	13.3
Minus Error . . .	1.5	21.1	54.6	24.6	6.3	55.5
Total Error . . .	53.4	42.3	61.4	47.0	63.2	68.8
Average Error . .	1.27	1.0	1.46	1.11	1.5	1.63

variation in judgments with reference to individual papers, 50 Fine papers and 50 Coarse papers were selected out of the whole collection for further study. They were selected so as to cover about evenly the whole range of quality from worst to best. The variations of each judge from the average of the three were tabulated, with the results shown in Table XI.

TABLE XI

COMPARATIVE ERRORS IN SCORES OF 50 PAPERS

Judge	Fine Scores			Coarse Scores		
	A	B	C	A	B	C
Plus Error	52.4	67.2	96.1	67.0	117.7	30.0
Minus Error	66.2	68.7	68.3	41.0	20.1	141.9
Total Error	118.6	135.9	164.4	108.0	137.87	171.9
Average Error	2.37	2.71	3.28	2.16	2.45	3.43

The averages for the fifty Fine scores were 50.28, 51.84, and 52.42 respectively. The maximum difference is .58 of a point. The averages for the fifty Coarse scores given by the three judges were 49.22, 50.60, and 46.32 respectively. The maximum difference in this case was 4.28 points.

In the Fine papers the errors range from 2.37 to 3.28 points. In the Coarse papers the average errors range from 2.16 to 3.43 points. In general, the differences are less than half the distance between two samples on the scales.

A further test of the reliability of the measures was made by an intercorrelation of the scores of each judge with those of the others and also with the average scores. The correlations found in the case of the fifty Fine papers are shown in Table XII.

TABLE XII

CORRELATIONS IN THE CASE OF FIFTY FINE PAPERS

Between	Scores of Judge A	Scores of Judge B	Scores of Judge C
Scores of Judge B	.93		
Scores of Judge C	.89	.87	
Average Scores	.98	.97	.95

In the case of the fifty Coarse scores the correlations were even higher.

Forty-eight of these Fine papers were judged by a fourth man, who was an expert writer and teacher of writing but who had no special training in the use of the scales except to read the directions. His average for the forty-eight was 50.58 while judges A, B, and C gave averages of 52.27, 51.77, and 52.35 respectively to the same set of papers. The untrained judge's average error on the 48 papers was 6.04, while the other judges differed from their common average by 2.43, 2.76, and 3.35 points each. His minus errors were three times as great as his plus errors, showing that he was still more severe in his marking than any of the others. The difference would have been less if his scores had been averaged in with the others to obtain the true score with which to compare the individual judgment.

A group of five students in Psychology were shown the scales and given the fifteen Fine papers of one Sixth Class to score. The three expert judges gave an average of 67.3 to these 15 papers. The students of the psychology class working together obtained an average score of 69.9. They were more generous in their scoring than the regular judges were. Their average differences from the average grades of the trained judges ranged from zero to 5.7 points.

CHAPTER V

STANDARDS OF PERFORMANCE

The body of material presented in Chapter IV, which gave us the scores of 1,127 pupils in Grades I to IX in eight different schools and in both kinds of writing, gives us also the opportunity to discover the relationships of Fine and Coarse Nastaliq writing to age and grade progress and to state tentative mid-year norms in these two types of Persian writing.

Unreliability of the ages.- There are reasons to believe that the information given by the students as to their ages is unreliable. Table XIII and Figure 3 give the information in regard to the ages reported by the 1,127 pupils in this study. The largest constant error could be allowed for, namely, that the pupil usually gives his age as the year he has entered, not the year he has completed. Thus, after he has completed eight years he calls himself nine years old. In order to be sure, we have to ask whether he has completed nine years or, as the Persian has it, has "put his foot into" the ninth year. It is quite likely, therefore, that most of the 1,127 pupils gave their ages as one year too great.

Another error which is more uncertain in effect is that many pupils do not know how old they are and the guess which they set down may be a year or two incorrect either way. Some pupils gave one age on one paper and another age on the other. We had to ask the teacher who gave us the papers as to which was more probably true.

A third error is probable around the age of thirteen. There is a noticeable depression in the curve at 13. The number giving their ages as 12 and 14 are both larger. It is quite likely that some who should have said they were 13 called themselves 12 or 14 instead, in order to avoid attaching the unlucky number to their names!

Distribution of the pupils in the grades.- The grade distribution of the pupils giving the 1,127 pairs of papers which we have used is shown in Table XIII and Figure 4. For comparative purposes it would have been better to have fewer papers from Grade III and more from Grades VII, VIII, and IX. But at the time more papers from the higher grades were not obtainable. The 21

TABLE XIII

AGE-GRADE DISTRIBUTION OF 1,127 PUPILS WHO SUPPLIED SAMPLES OF WRITING. AVERAGE AGE OF EACH GRADE AND AVERAGE GRADE OF EACH AGE

Age	Grade									Freq.	Average
	1	2	3	4	5	6	7	8	9		
21 . . .									2	2	9.0
20 . . .								2	1	3	8.3
19 . . .							2	2	7	11	8.4
18 . . .						1	7	8	13	29	8.1
17 . . .					3	6	13	12	18	52	7.6
16 . . .			1	1	4	11	11	16	13	57	7.2
15 . . .			2	6	17	22	15	12	3	77	6.1
14 . . .	1	3	8	23	27	39	30	18	3	152	5.7
13 . . .		7	16	28	32	26	8	5		122	4.8
12 . . .	1	7	42	55	55	39	11	4		214	4.5
11 . . .	2	24	41	41	31	5	3	1		148	3.6
10 . . .	2	43	65	28	4	2	1			145	2.9
9 . . .	8	32	23	5						68	2.3
8 . . .	5	25	13							43	2.1
7 . . .	2		2							4	2.0
Frequency	21	141	213	187	173	151	101	80	60	1127	
Average	9.2	9.2	10.7	11.6	12.7	13.5	14.7	15.4	17.1		

Age - Mean, 12.53; S.D., 2.55

Grade - Mean, 4.74; S.D., 2.06

pupils in Grade I all were in one school and are probably not typical of all first grades.

Age-Grade relationships.- The relation of age to grade of the 1,127 pupils is shown by Table XIII and Figure 5, which gives the relation lines of the means of the rows and columns. The correlation coefficient (r) for the table is $r = .782 \pm .008$. In view of the unreliability of the ages, this relationship is not particularly valuable.

Progress in writing through the grades.- Table IX shows for both types of writing the average scores given to each grade in each school and the average score for each grade in all schools from which we had samples.

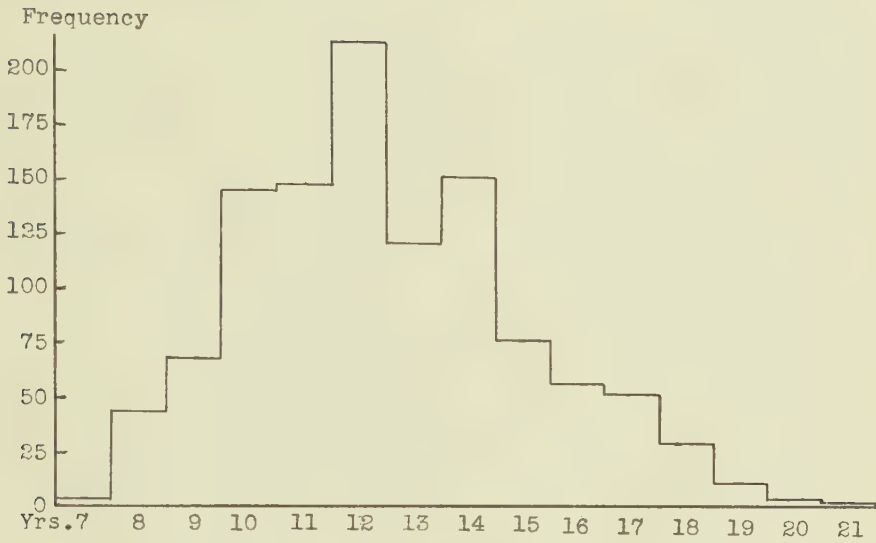


Fig. 3.- Distribution of Ages - 1127 cases.

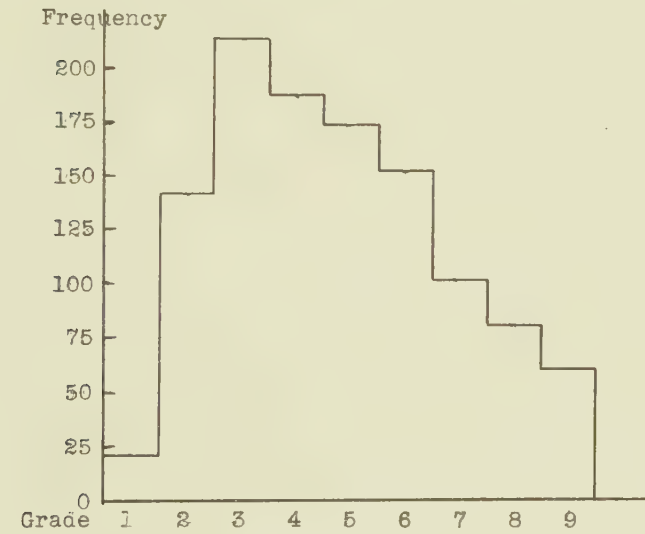


Fig. 4.- Distribution of Grades - 1127 cases.



Fig. 5.- Relation lines of Age and Grade - Based on averages shown in Table XIII.

Fine scores from grade to grade.- Looking at the Fine averages first, we see that, taking all schools together, the average scores range from 40.8 in the first grade to 69.5 in the ninth. It is easily seen in the upper curve in Figure 6, which represents these averages graphically, that the progress is very rapid from Grades I to III, much slower from Grades III to VI, and very little from Grades VI to IX. The total difference from I to IX is 28.7 points on the Fine scale. Between Grades VI and VII there is only one-tenth of a point difference and between Grades VIII and IX only two-tenths of a point of progress.

Coarse scores from grade to grade.- Coarse score averages rise from 31.6 to 61 in the nine grades, a total difference of 29.4 points on the Coarse scale. This is shown graphically in the lower curve in Figure 6. The rise is more uniform than that of the Fine curve. There is slightly more rapid advance up to the fourth grade than there is from the fourth on to the ninth.

Leaving the first grade out of account as being small and non-representative, there is nearly twice as much progress in Coarse writing from Grades II to IX as there is in Fine writing, 25 points as compared with 13.9. From Grade III to IX Coarse writing makes nearly three times as much progress as Fine, 19.1 points as compared to 7. In terms of the scales, Fine writing from Grades III to IX advances less than one space on the Fine scale while Coarse writing advances two spaces on the Coarse scale.

Combined scores from grade to grade.- Figure 7 combines the averages for each grade, showing where each grade stands in relation to the other in both styles of writing. In general, the curve shows at first rapid growth in Fine writing and slower growth in Coarse, with the latter increasing more rapidly after the third grade and Fine making relatively less progress.

School differences in progress.- An examination of the growth curves of the separate schools shown in Figure 8 (Schools I to VIII) reveals variations of the facts brought out by the scores of all schools together. Among these facts we find:

1. Greater progress in Coarse than in Fine writing.
2. Rapid progress in Grades II and III, slower progress later.
3. School I shows continued progress from Grade I to VI except in Coarse, which makes no progress from IV to V.
4. School VII shows decline in both styles of writing from Grade VI to VII and in Fine from VIII to IX.
5. School VIII declines from VII to VIII but more than recovers in IX.

Relationship of individual quality scores and grade progress.- So far we have considered only the relationship of the



Fig. 6.- Change of Fine and Coarse Averages from Grade to Grade - Raw Scores.

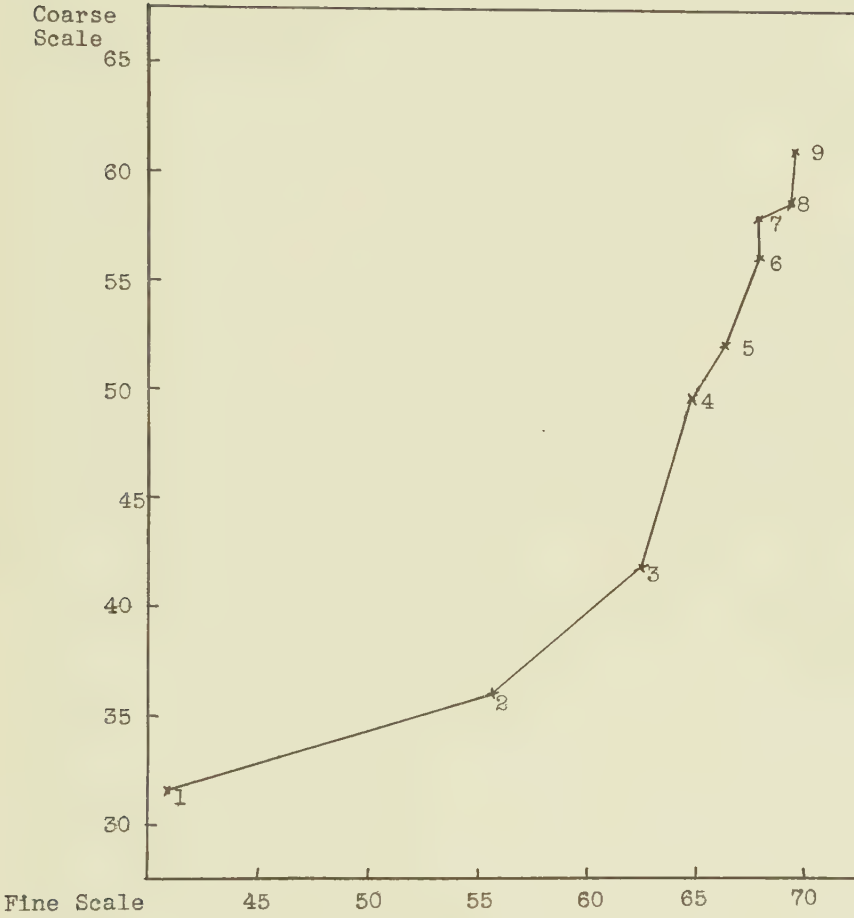


Fig. 7.- Combined Progress of Averages from Grade to Grade. The numbers along the curve indicate the grades for which the points are true.

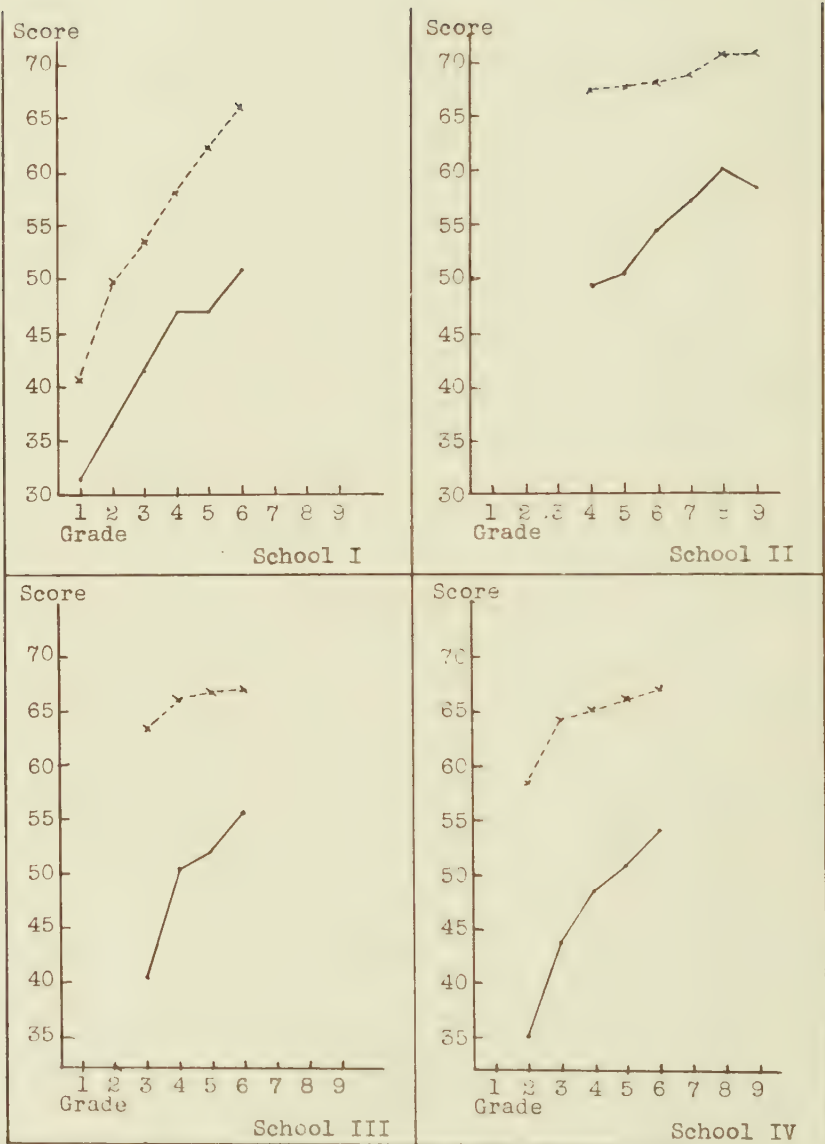


Fig. 8.- Fine and Coarse Progress from Grade to Grade in Eight Schools. Schools I, II, III, and IV.

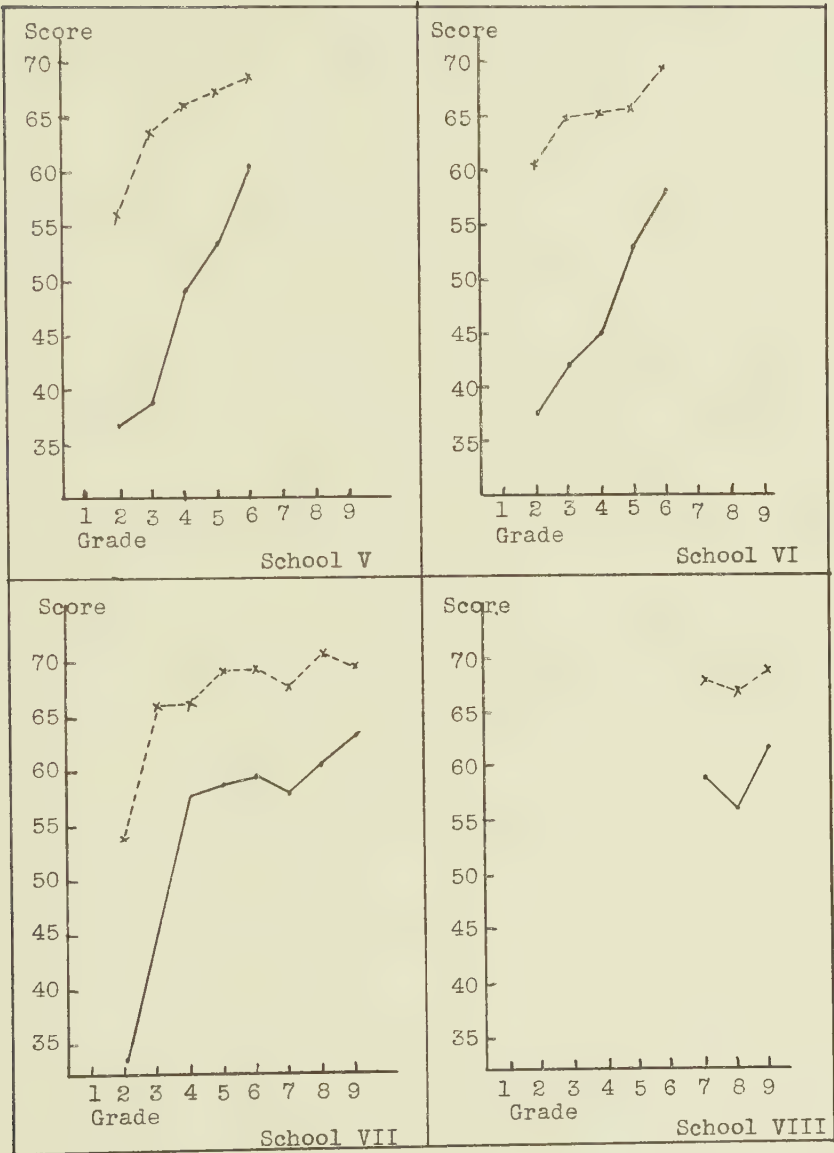


Fig. 8.- Continued. Schools V, VI, VII, and VIII.

TABLE XIV

RELATION OF THE FACTORS OF AGE, GRADE, FINE
SCORES, AND COARSE SCORES

Factor	Mean	S.D.	Correlation (r) with		
			Age	Grade	Fine
Age	12.53	2.55			
Grade	4.74	2.06	.782 $\pm$.008		
Fine Scores . . .	64.06	6.95	.482 $\pm$.016	.612 $\pm$.013	
Coarse Scores . .	49.15	9.80	.639 $\pm$.012	.796 $\pm$.007	.699 $\pm$.010

class averages to grade standing. Tables XV and XVI show the distribution of the individual Fine and Coarse scores and grade standing. The grade averages given in these tables are slightly different from those in Table IX because they were obtained in a different way. The averages given in Tables XV and XVI were obtained by grouping in frequency tables, while the averages in Table IX are arithmetical averages of the individual and class scores.

TABLE XV

FINE SCORE-GRADE DISTRIBUTION OF 1127 CASES WITH AVERAGE FINE
SCORE CORRESPONDING TO EACH GRADE AND AVERAGE GRADE
CORRESPONDING TO THE FINE SCORES

Grade	Fine Score														Freq.	Ave.
	25	30	35	40	45	50	55	60	65	70	75	80	85			
9 . . .									17	34	7	2		60	69.5	
8 . . .									23	41	14	2		80	69.6	
7 . . .									53	37	9	1	1	101	68.0	
6 . . .								4	76	64	6	1		151	67.4	
5 . . .						4	3	14	107	40	5			173	65.5	
4 . . .					1	2	17	24	116	27				187	63.9	
3 . . .				3	2	12	10	36	144	6				213	62.4	
2 . . .			1	7	9	21	35	38	30					141	56.2	
1 . . .	2	1	5	4	4	2	2	1						21	41.1	
Freq. .	2	1	6	14	16	41	67	117	566	249	41	3	1	1127		
Average	1.	1.	1.1	1.8	2.	2.6	2.7	3.2	4.6	6.4	7.2	7.8	7.			

TABLE XVI

COARSE SCORE-GRADE DISTRIBUTION OF 1127 CASES WITH AVERAGE COARSE SCORE CORRESPONDING TO EACH GRADE AND AVERAGE GRADE CORRESPONDING TO THE COARSE SCORES

Grade	Coarse Scores															Freq.	Ave.
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90		
9 . . .							2	15	19	14	6	2	1		1	60	61.9
8 . . .						2	4	27	27	15	3	4				80	59.3
7 . . .						4	8	40	38	6	3	1				101	57.7
6 . . .					1	11	27	66	30	11	2	5		1		151	55.5
5 . . .				1	5	43	51	52	15	4	1	1				173	51.3
4 . . .				1	21	72	44	38	7	3	1					187	48.6
3 . . .			4	27	94	64	21	3								215	41.9
2 . . .		4	20	55	54	7	1									141	36.5
1 . . .	1	6	3	7	3	1										21	32.0
Freq. .	1	10	27	91	178	204	158	241	136	51	16	11	1	1	1	1127	
Average	1.0	1.4	2.0	2.3	2.9	4.0	4.8	6.0	6.8	7.2	7.5	7.2	9.0	7.0	9.0		

Figures 9 and 10 give the curves of the Means of the rows and columns in the two tables.

The correlation between Fine scores and grade standing obtained from Table XV is $(r) = .612 \pm .013$. The correlation of Coarse scores and grade standing obtained from Table XVI is $(r) = .796 \pm .007$. This confirms the observation already made that there is more consistent progress in Coarse writing quality than there is in Fine writing.

Relation of speed and quality.- As has been noted, speed, which is an important part of performance in English writing, has no importance at all in Persian writing. The small amount of objective evidence which we have in hand shows this to be true.

By way of experiment, seventy-four pupils in Grades V and VI of the American Elementary School were given timed tests in Fine writing. Quality was measured by the scale for Fine writing. Speed was measured in letters written per minute. The results are shown in Table XVII.

The coefficient of correlation (r) between speed and quality for the 74 cases was found to be $-.089 \pm .07$. This means that, as far as this test and this group of students are concerned, there is no correlation between speed and quality. We believe that further tests would tend to show a larger negative correlation between them.

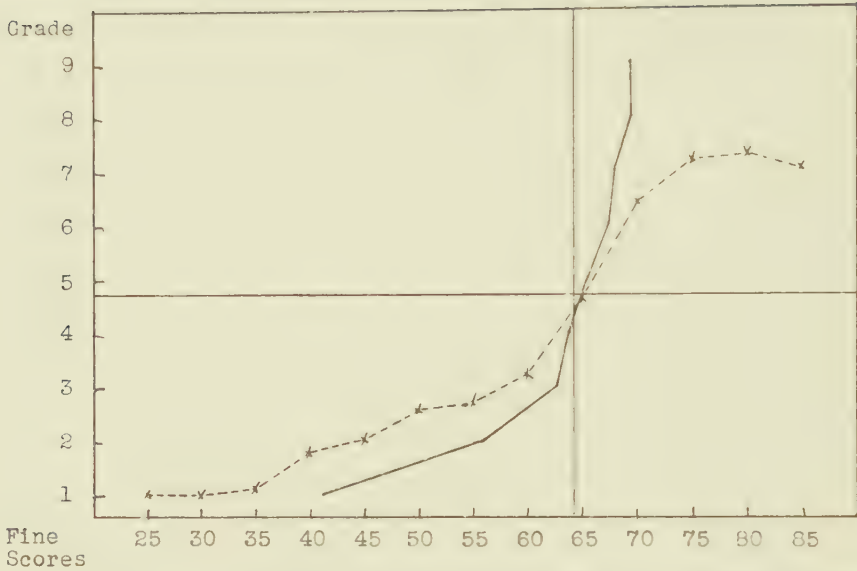


Fig. 9.- Relation Lines of Fine Scores and Grade. Data from Table XV.

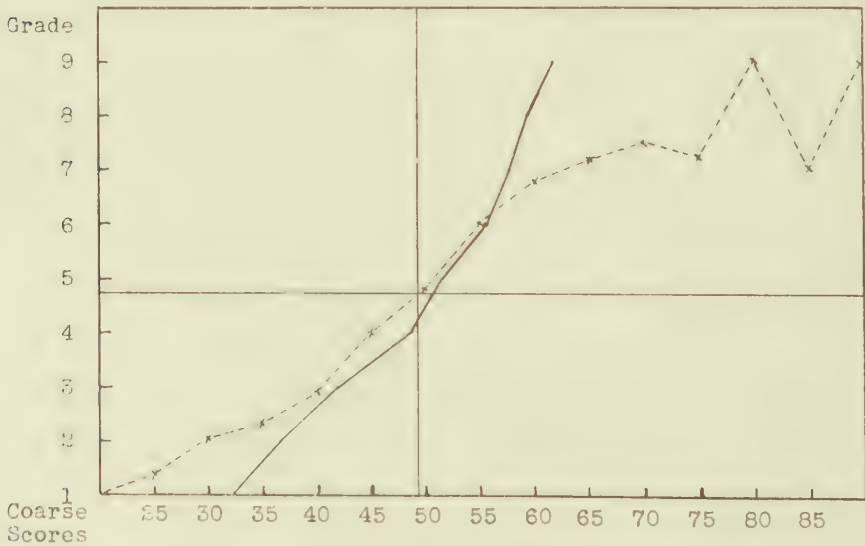


Fig. 10.- Relation Lines of Coarse Scores and Grade. Data from Table XVI.

TABLE XVII

RELATION OF SPEED AND QUALITY

Class	No. of Cases	Average No. of Letters Per Min.	Average Quality
5th	44	30	64
6th	30	41	88

CHAPTER VI

RELATION OF FINE AND COARSE WRITING

The original question with which we began our inquiry into Persian writing was this: "What is the relation between the Coarse writing which Persian writing teachers use as the basis of instruction and the Fine writing which they wish to be the final outcome of their teaching?" When we examine these related abilities in a large number of cases at different levels of ability, do we find facts to justify Persian writing teachers in expecting improvement in Fine writing when they give instruction only in the Coarse?

1. Differences between Fine and Coarse writing.- Before we take up a study of the facts of this relationship as revealed by the cases collected, it will be well to review the similarities and differences between these two forms of writing as a basis of our examination of the statistical material before us. There are reasons for expecting considerable relationship. There are other facts which would indicate small probable amount of correlation.

(1) The two products are similar in that both are called Persian Nastaliq writing but they are different in size. They are more alike than writing and printing English, for instance, would be. A better comparison would be the similarity between manuscript writing used in writing a letter and the same style used in sign making for a bulletin board. Both require manual dexterity and control. Both demand a sense of proportion and beauty, and the ability to discriminate small differences. Both are helped or hindered by the quality of pen, paper, and ink used.

(2) There is great difference in the way the two samples of writing are produced by the same pupil. Fine writing is done more rapidly than coarse writing. Fine writing is made with complete strokes and with fair rapidity, although much more slowly than English writing. Coarse writing is, as has already been explained, more like painting in which the pupil uses his pen as a brush and may make many strokes in his formation of a simple letter.

(3) The qualities emphasized in the two kinds of writing are different. In Coarse writing the pupil is striving for a good result largely in letter formation, with special attention to

proper size of letter as measured by the width of his pen-point, beauty of curves, degree of slant, proper shading, and the like. In the Fine sample the pupil's attention is only partly on letter formation although this is important. He is striving for straightness of line across the page, uniformity of line, proper spacing between lines, good placement on the page to give proper margins, and finally general neatness.

(4) Pupils and teachers agree that Coarse writing is more difficult than Fine. It is more difficult to make a beautiful large Persian letter S than it is to make a beautiful small one. The same is true of many other letters. Coarse writing is more difficult because errors in letter formation stand out more clearly in the enlarged form. In small sized writing the errors are not evident. The qualities emphasized by Fine writing as mentioned above are, in general, more easily acquired than the more technical skill required in designing large Persian letters with a broad pointed pen.

(5) A corollary of these facts which has its effect in the scores given to the two samples by the same pupil is the different effect of the two kinds of writing on the judges. In Coarse writing the attention of the judges is almost wholly on letter formation. It was not uncommon to see the judges make a letter to letter comparison of two specimens of Coarse writing in the process of determining which was better. In Fine writing they judged more by general appearance and could be more easily influenced by neatness and other general features. Just as letter formation in the large size is more difficult to produce, so defects in Coarse writing are more easily seen by the judges. Both of these sets of facts might tend to make the raw scores given for Coarse writing lower than those given for Fine writing equally good.

With these points of similarity and contrast in mind, we proceed with the study of the facts of relationship as shown by the 1,127 pairs of samples which have been presented in the previous chapter. Some of the facts of relationship have already been noted and will be repeated here. Others will appear in the course of this chapter. The distribution of the two sets of scores is shown in Table XVIII and their relation to each other is shown in Figure 11.

2. Raw Fine scores are higher than raw Coarse scores.- The most striking fact about the raw scores as displayed in Tables IX, XV, and XVI and Figures 9, 10, and 12 is that class averages and practically all individual scores are higher in the Fine than in the Coarse writing. The Mean of the Fine scores is 64.06. The Mean of the Coarse scores is 49.45. This would seem to indicate

TABLE XVIII

FINE SCORE-COARSE SCORE DISTRIBUTION OF 1127 CASES WITH AVERAGE FINE SCORE CORRESPONDING TO MAIN DIVISIONS ON COARSE SCALE AND AVERAGE COARSE SCORES CORRESPONDING TO MAIN DIVISIONS OF FINE SCALE

Coarse Scores	Fine Scores													Freq.	Ave.
	25	30	35	40	45	50	55	60	65	70	75	80	85		
90 ..												1		1	80.0
85 ..													1	1	85.0
80 ..														1	75.0
75 ..									1	3	5	2		11	73.6
70 ..										10	6			16	71.8
65 ..									10	28	10	3		51	70.5
60 ..									42	82	12			136	68.8
55 ..								1	144	89	7			241	67.1
50 ..						1	6	10	113	28				158	65.1
45 ..						4	19	41	131	9				204	62.9
40 ..			1	4	5	17	17	40	94					178	60.1
35 ..			1	4	5	13	18	21	29					91	57.2
30 ..			3	2	5	4	7	4	2					27	50.5
25 ..	1	1	1	4	1	2								10	39.5
20 ..	1													1	25.0
Freq.	2	1	6	14	16	41	67	117	566	249	41	6	1	1127	
Average	22.5	25	31.6	32.5	34.3	37.4	39.9	41.4	48.6	57.6	64.1	72.5	85		

a more than perfect transfer of training and to more than justify the Persian writing teacher's hopes, but further treatment of the scores and a closer examination of the situation reveal a different case, as will be shown later.

3. There is less dispersion in Fine scores.- More than half of the Fine scores (566 of them) are to be found in the group ranging from 62.5 to 67.5. The Coarse scores are less concentrated. The Standard Deviation of the Fine scores is 6.95, while the Standard Deviation of the Coarse scores is 9.80. The total range of the Fine scores is from 25 to 85; the range of Coarse scores is from 20 to 90.

4. Gain from grade to grade is greater in Coarse scores than in Fine.- The total gain in Fine writing from Grade II to Grade IX is 13.9 points; in the Coarse the gain is 25 points. The average gain in the Fine scores from Grade II to Grade IX is 1.98; in Coarse the average gain is 3.57 points. These facts are shown in Table IX.

5. Progress in Coarse writing is more consistent from grade to grade.- Not only is the average and total gain in Coarse writing greater, but the correlation between grade and Coarse scores is greater than that between grade and Fine scores.

Coarse

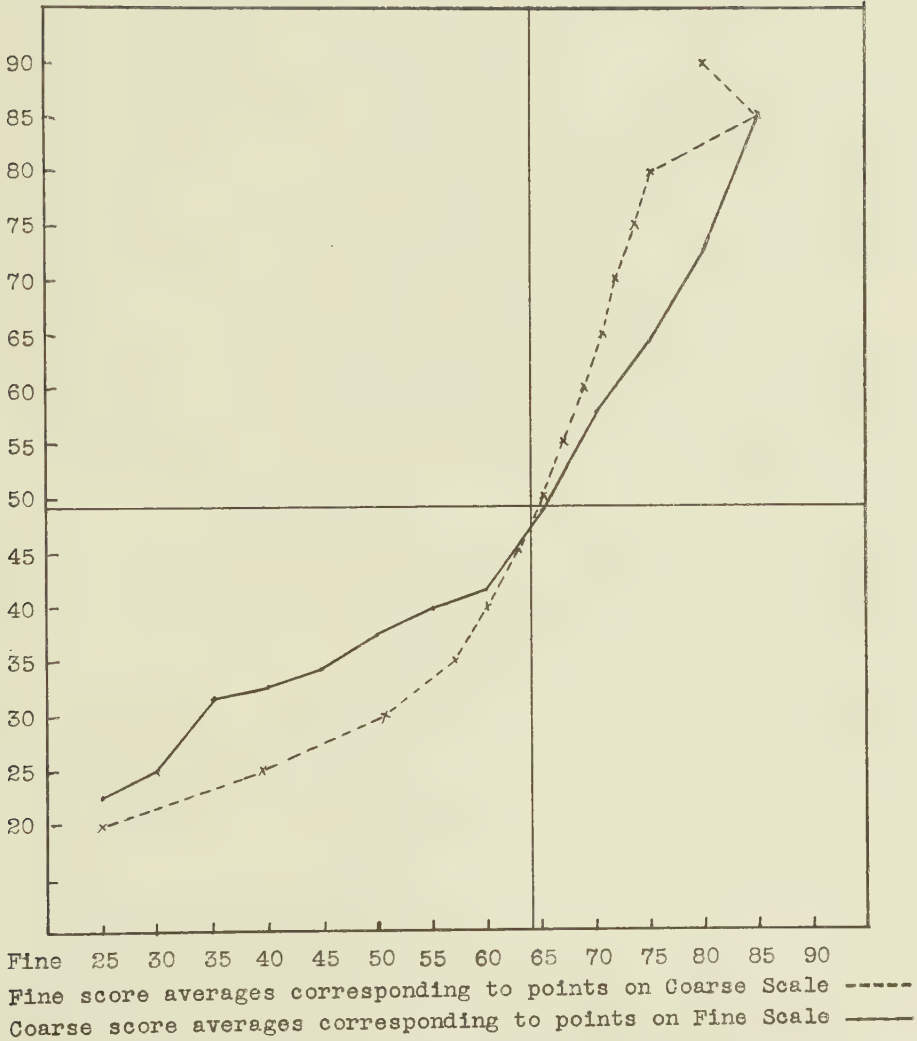


Fig. 11.- Fine and Coarse Scores - Lines of Relationship.
Based on averages given in Table XVIII.

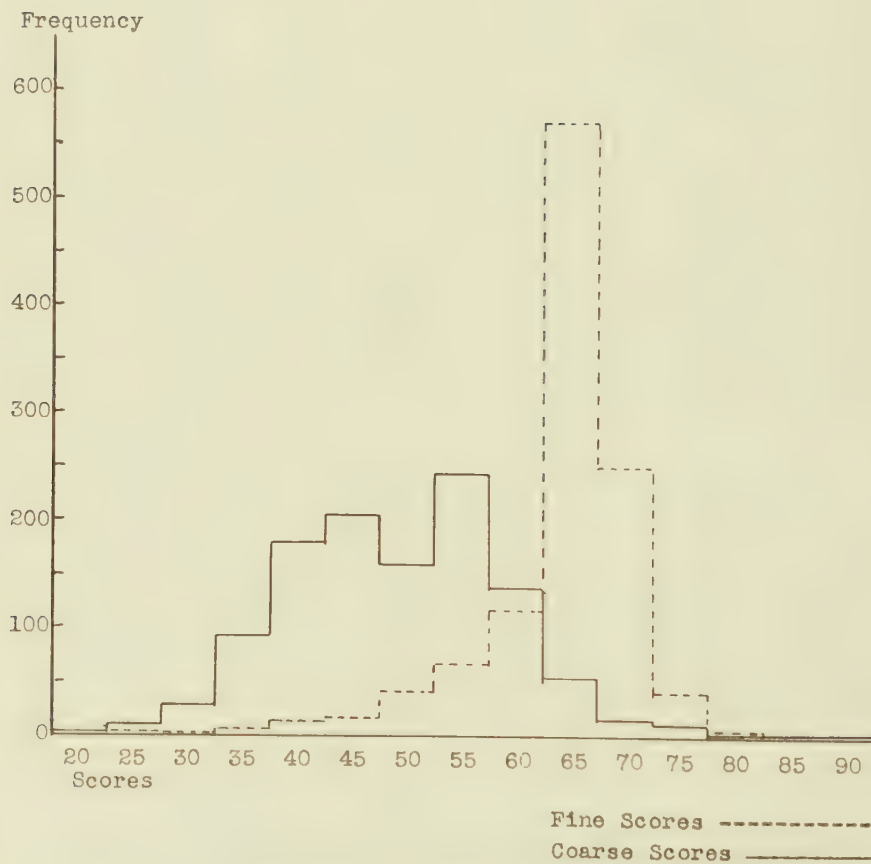


Fig. 12.- Distribution of Fine and Coarse Raw Scores - 1127 cases.

Coefficient of Correlation (r) between grade and Coarse scores
is $r = .796 \pm .007$.

Coefficient of Correlation (r) between grade and Fine scores
is $r = .612 \pm .013$.

Coefficient of Correlation (r) between Fine and Coarse scores
is $r = .699 \pm .01$.

Two conclusions may be drawn from these correlations.

First, as pupils advance from grade to grade, there is more likelihood of progress in Coarse writing than in Fine writing. We would expect this to be true because specific instruction is given in Coarse writing and not in Fine. That it is true is shown by the foregoing examination of the grade to grade changes. Second, progress in Fine writing is more related to progress in Coarse writing than it is to progress from grade to grade. This conclusion would be a point in favor of the contention of the Persian writing teachers that "a pupil's Fine writing will be good if his Coarse writing is good." It will be examined again.

6. Partial correlations.— These conclusions are further confirmed by a resort to partial correlations. The correlations of Fine scores, Coarse scores, and grade to each other are shown by test to be not rectilinear, but using them as if they were and using the method of partial correlations we find the effects shown in Table XIX.

TABLE XIX

PARTIAL CORRELATIONS OF GRADE AND SCORES

The Relation (r) Between	When Holding Constant	Is Changed	
		From	To
Grade and Coarse Scores	Ability in Fine Writing	.79	.64
Grade and Fine Scores	Ability in Coarse Writing	.61	.14
Fine Scores and Coarse	Grade	.69	.42

Taking these effects in the reverse order, it appears:

(1) That grade is of considerable influence in the relationship of Fine and Coarse writing and that if all of these students were of the same grade there would be much less correlation between Fine and Coarse scores than there is.

(2) That if all of these students had the same ability in Coarse writing, there would be comparatively little correlation remaining between progress from grade to grade and Fine writing scores. In other words, the correlation of Fine scores and grade

is present largely because of the relation of both to progress in Coarse writing. We have seen already that the actual progress of Fine scores from grade to grade was less than that of Coarse.

(3) That if all had equal ability in Fine writing the relationship between grade and Coarse writing would be somewhat reduced but the reduction would not be as great as was the case between grade and Fine scores when Coarse writing ability was held constant.

7. Relationships not the same at all stages.- That the relationship is not the same at all stages of development is indicated by the selective correlations given in Table XX. The scores of all pupils in Grades III, VI, and IX were separated from others and the correlation between Fine and Coarse scores was determined for each of these groups.

TABLE XX

SELECTIVE CORRELATIONS OF FINE AND COARSE SCORES

In Grade	Number of Cases	Correlation (r)
III	213	.192 $\pm$.045
VI	151	.526 $\pm$.040
IX	60	.457 $\pm$.068

The correlation between the two types of writing is small in the earlier stage but increases greatly in the Sixth Class. In the Ninth Class the relationship shows a tendency to decline again, probably due to the fact that Coarse writing is not emphasized in the Middle School or that the Fine writing at this stage is being changed to the cursive, "Shekasteh" style.

Before we draw further conclusions from these facts, we will examine the effect of other treatment of our data.

8. Effect of reducing raw scores to a comparable basis.- In view of the fact that our two scales are apparently measuring different though related things, it is questionable whether the direct comparison of raw scores which was made earlier in the chapter was justified or revealed the true situation. It is necessary therefore to reduce all measures to a comparable basis.

Measurements on unlike scales may be brought into direct comparison by the method of Standard Scores.¹ The scores of one

¹Karl J. Holzinger, Statistical Methods for Students in Education, pp. 118-22. Boston: Ginn & Co., 1928.

array may be reduced to the Mean and Standard Deviation of the other, or both may be reduced to a common basis. We have followed the second course.

The raw Fine and Coarse scores were changed to a comparable basis (Standard Scores) so that both arrays have a Mean of 50 and a Standard Deviation of 10. This was done on the basis of the formula¹

$$T = X_1 = M_1 + \frac{\sigma_1}{\sigma_2} (X_2 - M_2)$$

in which M_1 is the new Mean of 50, σ_1 the new S.D., which is 10, X_2 the raw score, σ_2 the Standard Deviation of the raw score array, and M_2 the Mean of the raw score array. Substituting the proper values, we have

$$(1) \quad T \text{ (Fine)} = 50 + \frac{10}{6.95} (X - 64.06) \quad \text{from which}$$

$$(2) \quad T \text{ (Fine)} = 1.43 X - 41.6 \quad \text{and}$$

$$(3) \quad T \text{ (Coarse)} = 50 + \frac{10}{9.8} (Y - 49.15) \quad \text{from which}$$

$$(4) \quad T \text{ (Coarse)} = 1.02 Y - .13$$

From equations (2) and (4) it was possible to transform Fine and Coarse raw scores into comparable T scores so that both arrays had a Mean of 50 and a S.D. of 10. The T scores, here so-called, are similar to the T scores suggested by McCall² but are not the same, as will be seen in a later section when we reduce our measures to the basis suggested by McCall.

When the class and grade averages of Table IX are reduced to the comparable basis as just described, we have the values given in Tables XXI and XXII. The Coarse scores are only slightly raised because the original Coarse distribution already had a Mean of nearly 50 (49.15) and a S.D. of nearly 10 (9.8). The Fine scores are, however, considerably reduced.

The revised Fine and Coarse grade averages, in terms of Standard Scores, are given in the last columns of Tables XXI and XXII and are shown graphically in Figure 13. Disregarding the values for grade I, since we have only one class representing that grade, we find the following tendencies from Grade II to IX:

¹Holzinger, op. cit., p. 121.

²William A. McCall, How to Measure in Education, Chapter X. New York: Macmillan Co., 1923.

TABLE XXI

CLASS AND GRADE AVERAGES - FINE SCALE - STANDARD SCORE VALUES

Grade	School								Average
	I	II	III	IV	V	VI	VII	VIII	
1	16.7								16.7
2	29.6			42.1	38.0	44.4	35.1		37.9
3	35.0		49.0	51.0	48.7	50.9	52.2		47.7
4	41.4	54.9	52.9	51.7	52.6	51.3	52.6		51.0
5	47.2	54.9	53.6	53.6	54.3	51.7	57.0		53.2
6	52.6	55.6	54.4	54.6	56.2	57.0	57.3		55.3
7		56.4					54.9	55.0	55.4
8		59.3					59.5	53.6	57.4
9		59.3					57.6	56.3	57.7

TABLE XXII

CLASS AND GRADE AVERAGES - COARSE SCALE - STANDARD SCORE VALUES

Grade	School								Average
	I	II	III	IV	V	VI	VII	VIII	
1	32.1								32.1
2	37.5			36.2	37.2	38.0	34.0		36.5
3	42.5		41.2	44.7	39.3	42.0	45.5		42.6
4	48.2	50.3	51.2	49.7	49.8	45.7	58.7		50.5
5	47.9	51.2	53.0	51.9	54.2	53.6	59.4		53.0
6	51.9	55.5	56.7	55.6	61.3	58.9	60.1		57.1
7		58.1					58.8	59.6	58.8
8		61.0					61.5	56.4	59.6
9		59.7					64.1	62.3	62.0

(1) Grades II and III are better in Fine writing than they are in Coarse.

(2) There is almost no difference between the averages of the two kinds of writing in Grades IV and V.

(3) In Grades VI, VII, VIII, and IX, the grade averages of Coarse writing are superior to those of Fine writing.

Looking at the tendencies in the separate schools, as shown in Tables XXI and XXII and in Figure 14, we find various

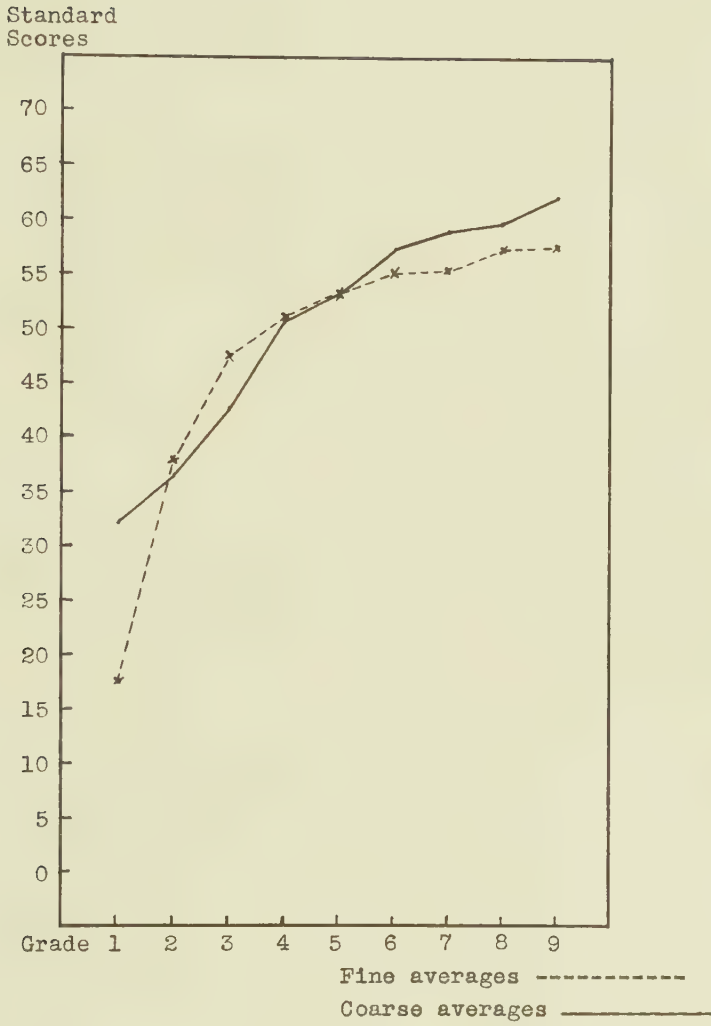


Fig. 13.- Fine and Coarse Averages from Grade to Grade in terms of Standard Score Values.

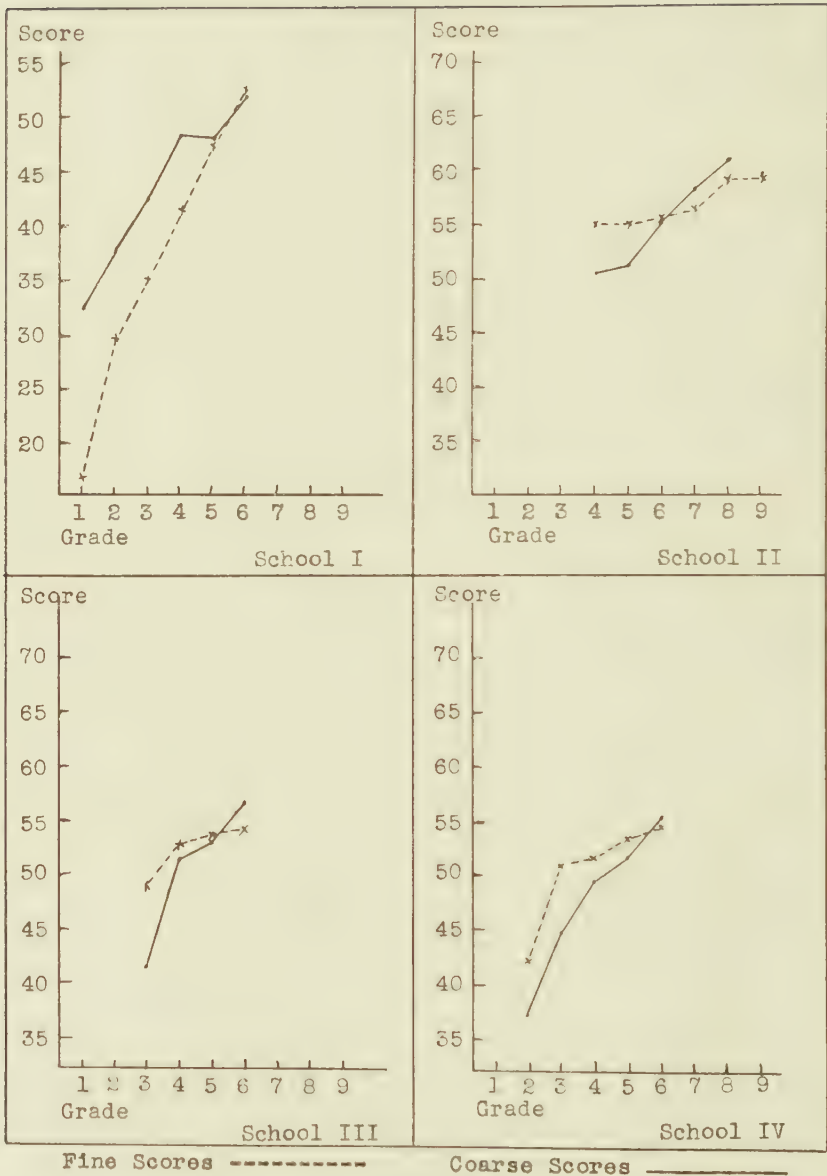


Fig. 14.- Grade tendencies in separate schools in terms of Standard Scores. Schools I, II, III, and IV.

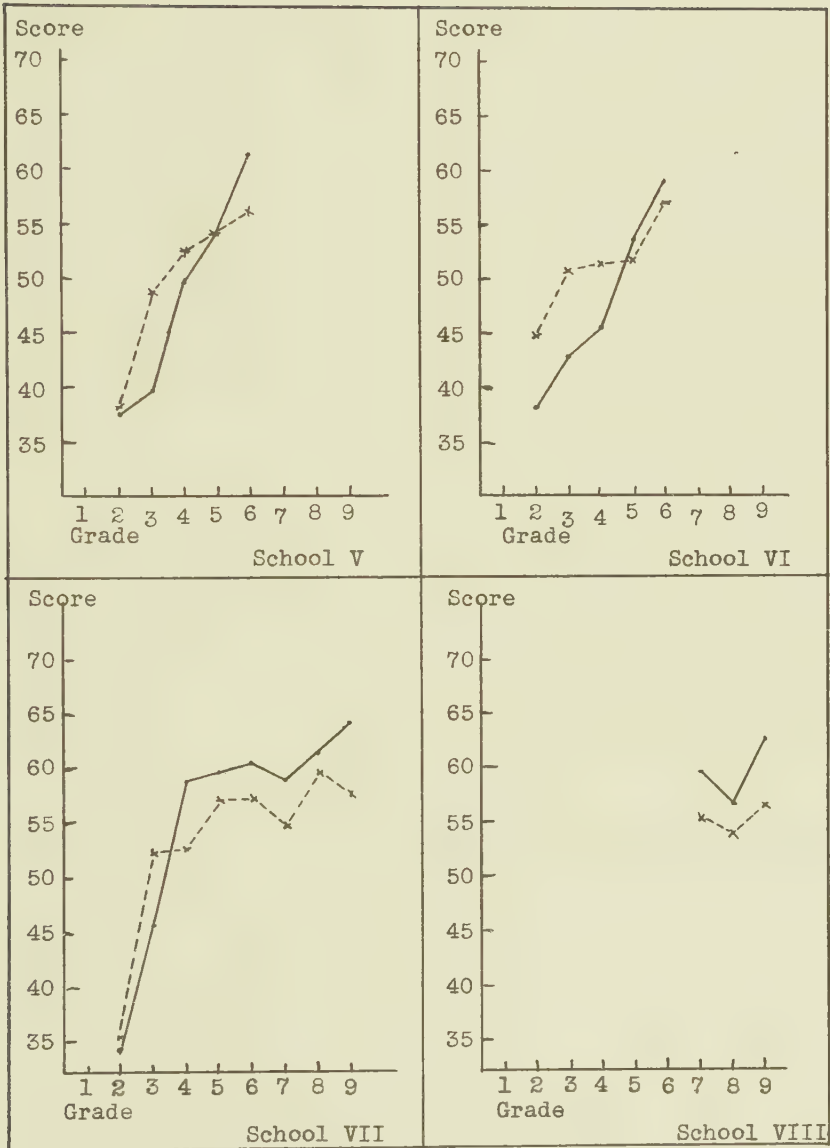


Fig. 14.- Continued. Schools V, VI, VII, and VIII.

combinations of superiority of one over the other. In all schools except I and II, Coarse writing achieves superiority at least in the Sixth Grade and in schools I and II the Coarse is less than one point behind the Fine. In School I, Coarse is ahead in all grades except in the Sixth. In other schools, the Coarse rises above the Fine at points varying from the Fourth Grade to the Seventh Grade. In all nine of the Middle School classes from which we have samples, Coarse is superior to Fine in the averages.

The general tendency, then, seems to be for Fine writing to be better than Coarse in the earlier stages and for Coarse to surpass it in the later stages.

A comparison of the Fine class averages given in Table XXI with the Coarse averages in Table XXII (all scores having been reduced to the comparable basis) shows that Coarse class averages are better than Fine class averages in 22 out of the 42 classes. The amounts by which they differ and the direction of the differences are shown in Table XXIII.

TABLE XXIII

AMOUNTS BY WHICH COARSE AVERAGES EXCEEDED FINE AVERAGES IN THE 42 CLASSES WHEN ALL WERE REDUCED TO COMPARABLE BASIS

Grade	School								Total	Average
	I	II	III	IV	V	VI	VII	VIII		
1	+15.4								15.4	15.4
2	7.9			-5.9	-.8	-6.4	-1.1		- 6.3	- 1.26
3	7.5		-7.7	-6.3	-9.4	-8.2	-6.7		-30.8	- 5.13
4	6.8	-4.6	-1.7	-2.0	-2.8	-5.6	6.1		- 3.8	- .54
5	.7	-3.7	-.6	-1.7	-.1	1.9	2.4		- 1.1	- .15
6	-.7	-.5	2.3	1.0	5.1	1.9	2.8		11.9	1.7
7		1.7					3.9	4.6	10.2	3.4
8		2.7					2.0	2.6	7.3	2.43
9		.4					6.5	6.0	12.9	4.3

With the exception of the first class in School I, the differences are not very large either way. The proportion of classes in which Coarse is better than Fine increases as we rise from the Third Class to the Ninth.

The point to be noted, however, is that, whereas the comparison of raw scores showed Fine writing to rate higher than Coarse, the comparison of these comparable scores in general shows a superiority of Coarse scores over Fine.

9. Effect of weighting scale values according to the performance of a single age group.- It has been urged by McCall¹ that all scales for measuring educational products be put on a comparable basis by using the Mean performance of twelve-year-old children as the point of reference and .1 S.D. as the unit of the scale, thus placing zero at 5 S.D. below the Mean performance.

The chief objection to using this method for scaling the values of our scales in Persian writing is the uncertainty as to which is the 12 year old group. As has been shown previously, the ages reported are unreliable for at least three reasons: first, actual ignorance of their ages; second, the tendency to report the age as the year one has entered; and, third, the avoidance of the age thirteen.

In spite of this uncertainty, however, we have attempted to see what difference would be made in the scale values if they were re-scaled according to the performance of an age group. We experimented with a combination of ages, such as those reporting themselves as 12, 13, and 14 years of age, but found the result very little, if any, different from that obtained when using the 12 year old group alone. We therefore re-scaled the values on the basis of those calling themselves 12 years old, it being understood that probably some of the 214 in this group were actually 11 years old and some 13 years old. The average age of all the 1,127 pupils was 12.54 years and the average performances of the 12 year olds were practically the same as the averages of all together. The range of performance in the 12 year old group did not cover the range of the whole group but covered a wider range in the Coarse than in the Fine. In general, the so-called 12 year old group represents the whole population very well.

Tables XXIV and XXV show the method used for transforming the main scale points into corresponding weighted values or T score values.

Column (1) of each table gives the original scale value.

Column (2) shows the number in the so-called "12 year old group who attained each of the points on the scale.

Column (3) in each table shows for each division of the scale the number surpassing plus one-half of those reaching that point. Thus, in Table XXIV, six students out of 214 reach 75 and 31 reach 70. "None" surpassing 75 plus one-half of the six reaching 75 puts 3 in column three. Six surpassing 70 plus one-half of the 31 reaching 70 puts 21.5 in column (3) opposite 70. The remainder of column (3) was made up in the same way.

¹McCall, op. cit., Chapter X.

TABLE XXIV

METHOD OF CHANGING ORIGINAL FINE SCALE VALUES TO T SCORE
VALUES ON BASIS OF PERFORMANCE OF A SINGLE AGE GROUP

Original Fine Scale Values	Frequency	Number Exceeding Plus One- Half of Those Reaching	Per Cent of Total	Area from $\frac{x}{\sigma} = 0$	$\frac{x}{\sigma}$	T Score Values
40	1	213.5	99.7	.497	-2.74	22.6
45	2	212	99.0	.490	-2.32	26.8
50	5	208.5	97.4	.474	-1.94	30.6
55	6	203	94.8	.448	-1.62	33.8
60	16	192	89.7	.397	-1.26	37.4
65	147	110.5	51.6	.016	-0.04	49.6
70	31	21.5	10.0	.400	1.28	62.8
75	6	3.0	1.4	.486	2.19	71.9

TABLE XXV

METHOD OF CHANGING ORIGINAL COARSE SCALE VALUES TO T SCORE
VALUES ON BASIS OF PERFORMANCE OF A SINGLE AGE GROUP

Original Coarse Scale Values	Frequency	Number Exceeding Plus One- Half of Those Reaching	Per Cent of Total	Area from $\frac{x}{\sigma} = 0$	$\frac{x}{\sigma}$	T Score Values
25	1	213.5	99.7	.497	-2.74	22.6
30		213	99.5	.495	-2.57	24.3
35	11	207.5	96.8	.468	-1.85	31.5
40	37	183.5	85.7	.357	-1.06	39.4
45	53	138.5	64.7	.147	-0.37	46.3
50	41	91.5	42.7	.073	0.18	51.8
55	50	46	21.4	.286	0.79	57.9
60	14	14	6.5	.435	1.51	65.1
65	3	5.5	2.5	.475	1.96	69.6
70	2	3	1.4	.486	2.19	71.9
75	2	1	0.4	.496	2.65	76.5

Column (4) in each table is the per cent which the number in column (3) is of the total. For example, the sum of those surpassing 40 on the fine scale and one-half of those attaining 40 is 213.5, which is 99.7 per cent of the total.

Column (5). Subtracting 50 from the per cent just obtained gives the area of the surface of frequency remaining between this measure and the Mean—called in Table XII of Holzinger's Statistical Tables¹ "Area from $\bar{x}/\sigma = 0$." These are the figures given in the fifth column.

Column (6). Holzinger's Table XII, just mentioned, gives the equivalents for these areas in terms of S.D. distances above or below the Mean.

Column (7) gives the resulting T score value obtained by first adding 5 to the figure in column 6 to remove the minus quantities and refer all measures to a Theoretical Zero of 5 S.D. below the Mean, and second, multiplying by ten to give a per cent number again. The numbers in column 7 are the real McCall T score values, in contrast with the Standard Scores obtained in Section 8 of this chapter.

In Table XXVI, we have two sets of equivalents for our original scale values, one the Standard scores as found in Section 8 and the other the T score values just arrived at. Figures 15 and 16 show graphically the relationships of these three sets of values in the two scales.

With reference to the Fine scale values, we note that the Standard scores are much below the original scale values. There is more variation in the T score values. At 50 and 65 of the original scale values both Standard scores and T scores are about 30 and 50 respectively. Above original 65 and below original 50, T score values are greater than Standard score values. Between those two points Standard score values are greater.

According to the T score values, there is a larger difference between 60 and 70 than between any other two points on the scale. The space 60-70 is three times as great as the space 40-50 and three and one-half times as great as the space 50-60. Based on the performance of this age group, the relative difficulties of these three stages of Fine writing from 40 to 50, 50 to 60, and 60 to 70 are to each other as about 8, 6.8, and 25.4.

When we examine the Coarse scale values, we find little shift in values in either case. The Standard score values are practically the same as the original values. According to the

¹Karl J. Holzinger, Statistical Tables for Students in Education and Psychology. Chicago: University of Chicago Press, 1931.

TABLE XXVI

ORIGINAL SCALE VALUES AND TWO SETS OF EQUIVALENT VALUES

Fine Scale			Coarse Scale		
Original Scale Value	Standard Score Value	T Score Value	Original Scale Value	Standard Score Value	T Score Value
75	65.6	71.9	75	76.4	76.5
70	58.5	62.8	70	71.3	71.9
65	51.3	49.6	65	66.2	69.6
60	44.2	37.4	60	61.1	65.1
55	37.0	33.8	55	55.9	57.9
50	29.9	30.6	50	50.8	51.8
45	22.7	26.8	45	45.8	46.3
40	15.6	22.6	40	40.7	39.4
35	8.4		35	35.6	31.5
30	1.3		30	30.4	24.3
25			25	25.4	22.6

performance of the chosen age group, the earlier stages are more difficult than the later. The relative values are as follows: space 30-40 equals 15.1 points; space 40-50 equals 12.4; space 50-60 equals 13.3; and space 60-70 equals 6.8 points.

Table XXVII shows the change in values effected in the class averages by changing the raw scores first to the Standard score form and second to the values weighted according to the performance of the single age group.

The Standard scores, both Fine and Coarse are plotted together in Figure 13. The T score averages are shown in Figure 17. The Standard score averages show Coarse writing superior to Fine from Grade Six to Grade Nine. The T score values shift the averages so that Coarse is superior to Fine from Grade Four to Grade Nine.

10. Correlations within the limited age group.- Using the 214 cases in the limited age group, we have recalculated the correlations between grade, Fine scores, and Coarse scores to see if the shift in values made any material difference in the relationship of these three factors. The correlations are as follows:

Correlation between grade and Fine (T) scores, $r = .531 \pm .034$.

Correlation between grade and Coarse (T) scores, $r = .703 \pm .023$.

Correlation between Fine (T) scores and Coarse (T) scores, $r = .616 \pm .028$.

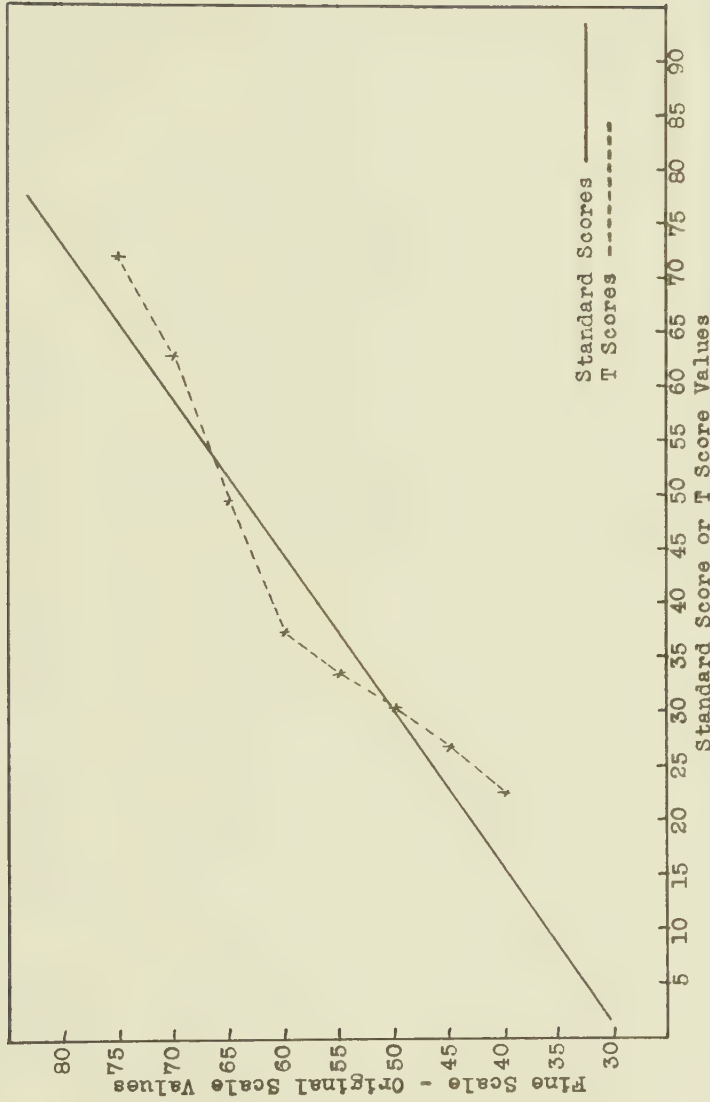


Fig. 15.- Graphical method for finding approximate Standard Score value or T Score value corresponding to a given Fine raw score.

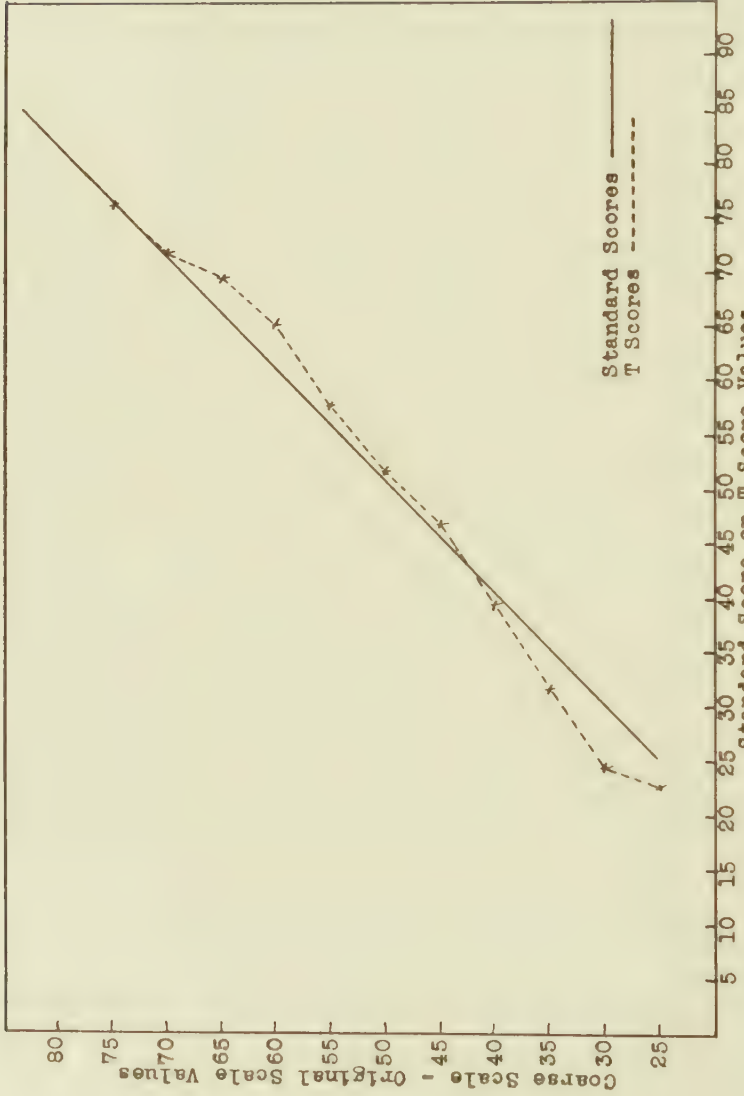


Fig. 16.- Graphical method for finding approximate Standard Score value or T Score value corresponding to a given Coarse raw score.

TABLE XXVII

CLASS AVERAGES IN ORIGINAL AND REVISED FORM

Fine Writing				Coarse Writing			
Class	Raw Scores	Standard Scores	T Scores	Class	Raw Scores	Standard Scores	T Scores
1	40.8	16.7	23.2	1	31.6	32.1	26.5
2	55.6	37.9	35.6	2	36.0	36.5	33.1
3	62.5	47.7	42.6	3	41.9	42.6	41.9
4	64.8	51.0	49.0	4	49.7	50.5	51.4
5	66.3	53.2	53.1	5	52.1	53.0	54.3
6	67.8	55.3	57.0	6	56.2	57.1	59.5
7	67.9	55.4	57.3	7	57.8	58.8	61.9
8	69.3	57.4	60.9	8	58.6	59.6	63.0
9	69.5	57.7	61.5	9	61.0	62.0	66.0

These same relationships in the larger group and with original scores were .61, .79, and .69, respectively.

We have also recalculated the partial correlations on the basis of these new figures and find the results given in Table XXVIII.

TABLE XXVIII

CORRELATIONS WITHIN LIMITED AGE GROUP

Correlation (r) Between	When Holding Constant	Is Changed	
		From	To
Grade and Coarse Writing (T) Scores	Ability in Fine Writing	.70	.56
Grade and Fine Writing (T) Scores	Ability in Coarse Writing	.53	.18
Fine (T) Scores and Coarse (T) Scores	Grade	.61	.39

These results are not essentially different from those given on page 51 as obtained from the whole group and with the original raw scores.

11. Conclusions.— At the beginning of this chapter, the direct comparisons of the raw Fine and Coarse scores seemed to show great superiority of the Fine writing over the Coarse. When

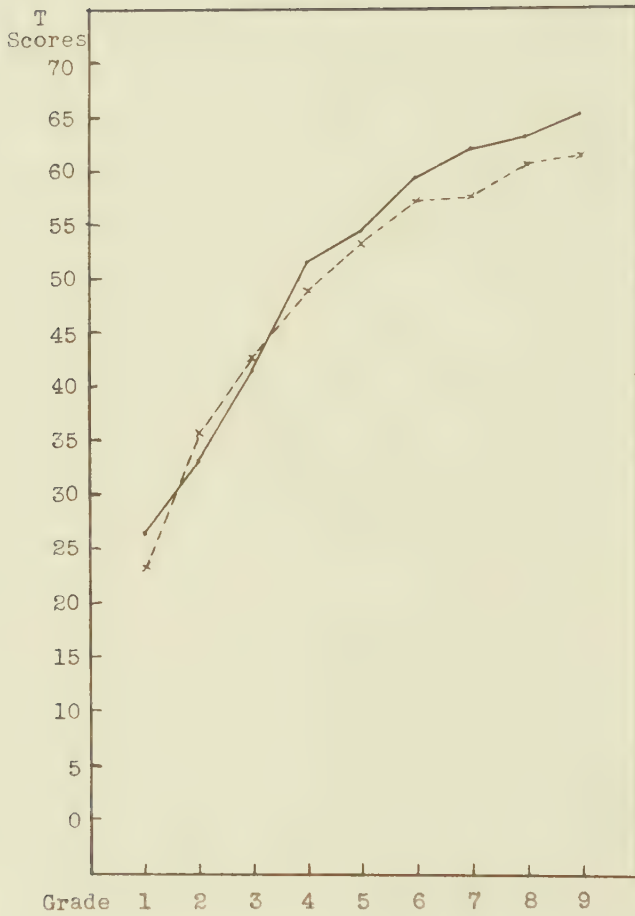


Fig. 17.- Grade Averages - T Score Values.

both sets of scores are reduced to a common basis, we find that the apparent superiority has disappeared and that, while Fine scores are superior to the Coarse in the earlier stages, the reverse is true in the higher classes. This is still further true when the scores are weighted in accordance with the performance of the group who called themselves 12 years of age.

There are, however, facts which the Persian writing teachers might use to justify their argument for the effectiveness of their method of teaching Fine writing indirectly through the medium of Coarse. The curves showing progress from grade to grade do follow one another rather closely. The correlation between Fine and Coarse scores is high, and the partial correlation between Fine and Coarse scores with grade held constant shows a very close connection between the two, even when we attempt to eliminate whatever influence may go with progress from grade to grade.

There is one way in which instruction in Coarse should affect the Fine product and that is in the important factor of letter formation. The most obvious usefulness of the instruction in Coarse writing is as a device to make clear how letters are formed, both as to the process and as to the product. To the extent that letter formation of Fine writing is influenced by this instruction in the Coarse and also to the extent that the judge's score of the Fine sample is influenced by its letter formation, to that extent will there surely be a functional relationship between the two scores. However, these two "extents" are not to be added together. They are a per cent of a per cent of influence. Not all of the instruction will carry over into the Fine writing and not all of the improvement will be recognized and be given credit in the judge's score.

The principal fact on the other side of the question is that Coarse writing shows the effect of direct instruction while much of the progress in Fine writing can be explained on other grounds than that of the indirect or transferred influence of training in Coarse writing. The effect of training in Coarse writing is shown in this, that while Coarse writing is said to be more difficult, it actually shows more progress from Grade II to Grade IX than Fine writing does, the excess gain being 11.1 points if we take the raw scores, or 5.7 and 7 points respectively if we use the Standard scores and T scores for comparison.

One reason for discounting the influence of training in Coarse writing upon progress in Fine is that, even though specific instruction is not given in Fine writing, the latter does not go altogether untrained. Every student has considerable practice in Fine writing without instruction from the teacher of writing. He

has some practice in copying pages from his reader for the purpose of improving his Fine writing. In this there would be a certain amount of self-instruction, as he strives to make his product more like the copy. He has other practice in his composition class, in rewriting his dictation exercises, and no doubt in other ways.

Some of the qualities emphasized in Fine writing which go to make up its score are improved by instruction received elsewhere than in the writing class. This improvement must also be discounted before credit can be given to the instruction in Coarse writing. Neatness of the written page, placement of writing on the page, proper margins, straightness of lines, spacing of lines, are all qualities of merit which would certainly be emphasized in composition and letter writing and perhaps in other connections. They are not a result of the instruction in Coarse writing, yet they would materially add to the quality and hence to the score of the Fine specimen.

A point to be made in explanation of the large correlation between Fine and Coarse writing, even when the influence of grade standing is eliminated, is that both abilities are affected by the same factors. The presence or absence of certain physical and mental qualities, such as muscular control, sense of proportion, attention to detail, desire to excel, and many others, would improve or impair both types of writing and tend to make their relative standing more alike than they would be if they depended on different sets of mental and physical traits.

Improvement in the process in which specific instruction is given is greater than in the process in which training is not given. The two types of writing do improve together but only to a small degree can we say that the improvement in Fine writing is due to the influence of the instruction in Coarse writing. The improvement in Fine writing with respect to letter formation is no doubt influenced by the instruction in Coarse writing, but most of the improvement in other respects can be attributed to factors having nothing to do with Coarse writing or to factors which both styles of writing have in common.

The facts revealed in this analysis and statistical examination of a large number of cases indicate that Persian writing teachers would do better to teach Fine writing directly, using Coarse writing merely as a device with which to teach letter formation and other allied points.

CHAPTER VII

SUMMARY OF FINDINGS AND PROBLEMS FOR FURTHER STUDY

Summary of Findings

1. Persian writing as taught in Persian schools, particularly in the Elementary schools, consists of two kinds of writing done with different sized pen points. They are alike in appearance but not in size. Writing done with the broad pointed pen is used as the basis of instruction and this instruction is supposed to "carry over" into the writing done with the fine pointed pen, in which there is no instruction given.

2. Two scales were constructed, one for measuring the quality of the product of Persian writing done with the fine pointed pen, called Fine Nastaliq writing, and the other to measure the product of writing done with the broad pointed pen, called Coarse Nastaliq writing.

3. With these scales in hand, properly trained judges were able to produce class averages in 42 classes with a maximum error of 1.46 per cent on the Fine scale and 1.63 points on the Coarse scale. In the case of 50 selected papers of each kind, the average variations of the Fine scores ranged from 2.36 per cent to 3.28 per cent and of the Coarse scores from 2.16 to 3.43 per cent. The variations of untrained judges were greater.

4. Using class averages of the raw scores as the basis of judgment, Fine scores show rapid improvement from Grade I to III, slower improvement from Grades III to VI, and little improvement from Grade VI to Grade IX. Coarse scores show steady improvement from Grade I to Grade IX, but more rapid rise in the curve from I to IV than from IV to IX.

5. Different schools show different relationships between the two types of writing in progress from grade to grade.

6. Correlations of $r = .612 \pm .013$ between grade and Fine scores, and of $r = .796 \pm .007$ between grade and Coarse scores indicate more consistent progress in Coarse writing through the grades than in Fine writing.

7. Speed and quality have no correlation with each other. Speed is not cultivated and has no virtue in the Persian writing class.

8. Progress in Fine writing is not associated with prog-

ress in Coarse writing in the same degree at all stages. In Grade III the relationship is $r = .192 \pm .045$; in Grade VI, $r = .562 \pm .040$; and in Grade IX, $r = .457 \pm .068$.

9. Progress is more marked in Coarse writing, which is taught specifically, and relatively less progress is made in Fine writing, which is not taught.

10. When both sets of raw scores are reduced to a comparable basis by the method of Standard scores, the apparent superiority of Fine writing largely disappears. In general, the tendency seems to be for Fine writing to be better in the earlier stages and for Coarse writing to be superior in the classes above the fifth.

11. The proportion of classes in which Coarse is better than Fine increases as we rise from the third class to the ninth.

12. When the original scale values are weighted on the basis of the performance of a limited age group, the class averages are shifted so that Coarse writing is superior to Fine from Class IV to Class IX.

13. The weighted values indicate unequal difficulty for the different parts of the scales. In the Fine scale, spaces 40-50, 50-60, and 60-70 are to each other as 8, 6.8, and 25.4. In the Coarse scale, these same spaces are related to each other as 12.4, 13.3, and 6.8 points respectively.

14. Partial correlations with the raw scores and the whole 1,127 cases, and also with the weighted scores and the limited age group of 214, indicate, first, a large relationship between Coarse scores and grade to grade progress which is not greatly reduced when ability in Fine writing is held constant; second, that a smaller correlation between Fine scores and grade to grade progress is largely eliminated when ability in Coarse writing is held constant.

15. The argument of Persian writing teachers for the effectiveness of their method of teaching Fine writing indirectly through the Coarse is supported by the rather high correlation between the two of $r = .699 \pm .010$ and by the closeness with which the curves from grade to grade follow each other.

16. On the other hand, much of the improvement in Fine writing can be ascribed to practice independent of the writing class, to self-instruction of the student and instruction in other connections, leaving the single factor of letter formation as perhaps the only one through which there would be a transfer of training from Coarse writing to Fine.

17. The various factors brought out in this study indicate that Persian writing teachers would do better to teach Fine writing directly, using Coarse writing merely as a device with which to teach letter formation and allied points.

Problems for Further Study

1. A further study should be made of the location of the Zero Points on both scales, using other samples worse than our "Approximate Zero" and a larger number of judges to locate these worse samples not only with reference to each other and the present scale, but also relative to what would be considered by the judges to be "Real Zero."

2. The tentative scales developed in this study should be used as a basis for revision and the formation of new scales, using a larger number of judges and resulting in scales with division points on the even tens, 10, 20, 30, etc.

3. Experimental studies should be made on the problem of direct teaching of Fine writing to demonstrate in groups of equated ability the effect of instruction in Fine writing alone and instruction in Coarse writing alone, as compared with the present method of instruction in Coarse writing and practice in Fine, without instruction.

4. Experimental studies should be made of the effectiveness of teaching by the dotted letters, a method which is so widely used and which is more expensive than others.

5. Studies should be made to determine individual, class, and school differences of larger groups of both boys and girls at the end of the school year.

6. Examination should be made of the relationship of Fine and Coarse writing in the case of larger numbers of pupils and others whose writing is above 70 on both scales.

7. Experiments associated with (3) above should be made to see if specific instruction in Fine writing would increase the amount of spread in the classification of a group which now rate the same or nearly the same in that ability.

8. Further study should be made concerning the relation of speed and quality in Persian writing and experiments tried to improve the speed of Fine writing without spoiling the quality.

9. Studies should be made with a larger number of trained and untrained judges to determine the amount by which errors in judgment are reduced by the use of the scales as compared with judgments without the scales.

10. Attempts should be made to calibrate the two scales by having a number of both Fine and Coarse papers scored on both scales.

11. Experiments should be made to test the practicability of introducing the use of the steel pen to displace the present reed pen which wastes so much time of both pupil and teacher.

12. Since writing with a broad pointed pen is useful in Persian as a device for teaching letter formation, experiments

might be made to determine the usefulness of this device in teaching English writing.

A P P E N D I X

۱۹

آدر در ۱۰۰ مکرده از شیل
سان در شفا و طایه
رکاب در دی کند بزور
عظای بره مرصع و ناخن
آرد از این درین فرسود
مکن را معتقد شایان بیا

۲۴

آوردده اند که انوشیروان در شفا
کسای کردی کند بزور عظام
بره خیر نشان تا سقی فر «درد» فر
ایستاده از این بعد رنگ چه فر
درفایی بره وارد کرد گفت بسیار دلم
آوردده اند که انوشیروان در شفا

۳۵

آورد و آمد که این شهر و این درگاه
بازگشت به کربلا و عتبات
فرمود تا در آنجا بمانند
تا که بگویند نعمت شناسان
در این روز و در این شهر

۳۶

آورد و آمد که این شهر و این درگاه
بازگشت به کربلا و عتبات
فرمود تا در آنجا بمانند
تا که بگویند نعمت شناسان
در این روز و در این شهر

۵۲

آوردند که آن شیروان در کارگاه
کتاب می‌نویسد نبود غلام
به هر دوستانه آمد آورد شیروان
فرمود ملک را بخت بتان ۱۰۰ سمس
نزد و داده خراب شود گفتند از آنستند

۶۲

آوردند که آن شیروان در کارگاه
کتاب می‌نویسد نبود غلام به فرستاد
تا آمد آورد آن شیروان فرمود ملک
را بخت بتان تا ستمی نکرد و در خراب
نمودند آن را بخت ملک چه غلام
به هر دوستانه گفت بنابر ظم او

آوردند که انوشیروان در کنار کاخی سلطنتی
 کردی ملک بنور غلامی بد، فرستادند تا ملک آورد
 انوشیروان، فرمود ملک را بقیه ایشان تاریکی نبرد
 و ده خسته را بکشند و بیاوردند که چو ضرر
 خرابی بدو دارد آید گفت بیا و نظم اول در جهان اندک
 بوده است همه که آمدند قری بر آن فرید کرد تا بدین

غایت رسید

آوردند که انوشیروان در کنار کاخی کباب کردی
 نمک نمود غلامی بد و ستاوست تا نمک آورد
 فرمود نمک را بقیه ایشان تاریکی نبرد و ده
 خراب نشود گفتند انوشیروان چو ضرابی بد
 نه گفت نمک و نظم اول در جهان اندک
 وارده بود گفت قری بر آن فرید کرد تا
 بوده است همه که آمدند قری بر آن فرید کرد تا بدین

غایت رسید

۹۲

آورد و اندک نوشیر و آن در شکار کاهی شکار کباب کردی
نمک نبود غلامی بده فرستاد تا نمک آرد و نوشیر و آن فرمود نمک
را بقیمت بستان تا رسمی فرود و ده خراب نشود و نقد را نقد
نمک چه ضرر و خرابی بده و آرد و آید گفت فیا و غلم اول در جهان
اندک بوده است هر که آمد قدری بر آن فرید و تا بدین غایت

۹۵

اگر ز باغ رعیت ملک خورد سیبی
بر آورد غلامان او در حشا زینح

۸۵

اگر ز باغ رعیت ملک خورد سیبی
بر آورد غلامان او در حشا زینح

۷۵

اگر ز باغ رعیت ملک خورد سیبی
بر آورد غلامان او در حشا زینح
نه بخشنه که سلطان ستم روا داد

۶۵ اگر ز باغ رعیت ملک حردیسی

بر آورند غلامان او درخت از رخ

۵۴ اگر ز باغ رعیت ملک خور و سیاهی
بر آورند غلامان او درخت از رخ
به پنج بیضه که سلطان ستم رود و دارد

۴۵ اگر ز باغ رعیت ملک چوردیسی
بر آورند غلامان او درخت از رخ
به پنج بیضه که سلطان ستم رود و دارد

۳۶

اگر ز باغ رحمت ملک خورد سیبی
به آورند غلامان او درخت از بیخ
به بیخ بقیه که سلطان ستم روا دارد
نشند شکریافتن هنر از مرغ سیب

۲۶

اگر ز باغ رحمت ملک خورد سیبی
به آورند غلامان او درخت از بیخ
آه بیخ بقیه که سلطان ستم روا دارد

۱۶

اگر ز باغ رحمت ملک خورد سیبی
به آورند غلامان او درخت از بیخ
آه بیخ بقیه که سلطان ستم روا دارد
نشند شکریافتن هنر از مرغ سیب

